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IN THE

Supreme Court of the United States

OCTOBER TERM, 1981

THE CONNECTICUT LIGHT AND POWER COMPANY, *ET AL.*
Petitioners,

v.

NUCLEAR REGULATORY COMMISSION
Respondent.

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

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QUESTION PRESENTED

Whether, in judicial review of a rulemaking conducted under section 4 of the Administrative Procedure Act, a court may uphold a rule in respects which it would otherwise have held defective, on the ground that the availability of exemptions from the rule's requirements cures the defects.

PARTIES TO THE PROCEEDING BELOW

The following parties and intervenor appeared before the court of appeals: The Connecticut Light and Power Company, Hartford Electric Light Company, Holyoke Water Power Company, Northeast Nuclear Energy Company, Northeast Utilities Service Company, and Western Massachusetts Electric Company (Northeast Utilities); Boston Edison Company; Arkansas Power & Light Company, which is controlled by Middle South Utilities, Inc., and whose affiliates include Arkansas-Missouri Power Company, Louisiana Power & Light Company, Mississippi Power & Light Company, New Orleans Public Service, Inc., Middle South Services, Inc., and Middle South Energy, Inc.; Florida Power & Light Company; Baltimore Gas & Electric Company, which jointly owns Safe Harbor Water Power Company; Carolina Power & Light Company; and the Nuclear Regulatory Commission.

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PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

The Connecticut Light and Power Company, *et al.*[1] respectfully request that a writ of certiorari issue to review the judgment and opinion of the United States Court of Appeals for the District of Columbia Circuit in this case.

OPINIONS BELOW

The opinion of the court of appeals (App. A, *infra*) is reported at 673 F.2d 525. The Final Rule on Fire Protection Program for Operating Nuclear Power Plants of the Nuclear Regulatory Commission (App. B, *infra*) was published at 45

[1] The Connecticut Light and Power Company, The Hartford Electric Light Company, Western Massachusetts Electric Company, Northeast Nuclear Energy Company, Northeast Utilities Service Company, Boston Edison Company, Arkansas Power & Light Company, Florida Power & Light Company, and Baltimore Gas & Electric Company.

Fed. Reg. 76602 (Nov. 19, 1980). The Commission's Proposed Rule on Fire Protection for Nuclear Power Plants Operating Prior to January 1, 1979 (App. C, *infra*) was published at 45 Fed. Reg. 36082 (May 29, 1980).

JURISDICTION

The judgment of the court of appeals was entered on March 16, 1982, when the opinion of the court was docketed. This petition for certiorari is filed within 90 days of that date. The jurisdiction of this Court is invoked under 28 U.S.C. §1254(1).

STATUTORY PROVISIONS INVOLVED

Sections 4 and 10(e) of the Administrative Procedure Act, 5 U.S.C. §§553 and 706, are set out in Appendices D and E, *infra*.

STATEMENT OF THE CASE

Petitioners are electric utilities licensed by the Nuclear Regulatory Commission to operate nuclear electric generating plants. Following a fire at a Tennessee Valley Authority plant in 1975, the Commission commenced a program to revise existing fire safety standards, and to review both new and operating nuclear power plants against these new standards. Recognizing the need for flexibility as to plants already in service for which physical modification would be difficult, these standards (adopted in 1976) permitted choices from among a variety of design and fire protective features to achieve safety goals.

For the next several years, licensees and the Commission's staff performed numerous plant reviews. The reviews culminated in the resolution of most fire protection issues, with accompanying plant modifications accomplished by the licensees. In the majority of cases this review process was completed to the satisfaction of the NRC. However, at a few plants several fire protection issues remained unresolved, and in 1980 the Commission decided to resolve these issues in a notice and comment rulemaking. The rulemaking culminated in the Commission's adoption of a rule on fire protection for

operating plants (App. B, *infra*), commonly referred to as "Appendix R."[2] As relevant here, the rule consists of 15 specific requirements (App. B pp. 39-56). The majority of the requirements apply only to plants where the issue had not previously been resolved during NRC plant reviews between 1976 and 1980. One of the rule's requirements, however, fire protection of safe shutdown capability (section III.G, App. B pp. 41-43), was required to be implemented by all licensees, even if the Commission had already approved, and the licensee had implemented, plant modifications to achieve fire protection as to that matter. This requirement was one of the principal subjects of the appeal below.[3]

A nuclear power plant contains numerous circuits, or cables, that control the plant's safe shutdown equipment. These circuits are duplicated throughout the plant so that the loss of one circuit (due to any cause) does not prevent the operator from safely shutting down the plant. With respect to fire hazards, the goal is to protect the duplicate circuits so that a single fire cannot render both systems inoperable.

The Commission's proposed rule addressed this goal by requiring licensees to perform fire hazards analyses for each plant area, and, based on such analyses, to select from among a variety of protective features for the cables in that area. Such protective features, the proposed rule provided, "may consist of a combination of automatic and manual fire suppression capability, fire propagation retardants, physical separation, partial fire barriers, or alternate shutdown capability" (App. C p. 19). While the proposed rule would

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[2] The NRC's principal regulations governing licensed nuclear reactors appear in 10 C.F.R. Part 50. The Commission has added numerous appendices to Part 50, of which Appendix R (Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979) is at this time the most recent.

[3] The final rule included another requirement applicable to all plants, protection from reactor coolant pump lubrication oil fires (section III.O, App. B p. 55), that was also challenged by petitioners in the court of appeals.

have required more rigorous and detailed analyses of fire protection of safe shutdown circuits than had previously been performed, its flexible approach to the use of protective features was consistent with the Commission's long-standing recognition that modifications to cables in operating plants have substantial impacts.[4]

The Commission's final rule on fire protection differed fundamentally from the proposed rule. The NRC discarded the fire hazards analysis approach utilized in plant reviews, and reflected in the proposed rule, in favor of specific, rigid requirements. The final rule substituted three, and only three, permissible design criteria for fire protection of redundant safe shutdown circuits (section III.G, App. B pp. 41-43). To comply with the final rule, such circuits must be:

1. Separated horizontally by 20 feet, with automatic suppression systems;

2. Separated by a one-hour rated fire barrier, with automatic suppression systems; or

3. Separated by a three-hour rated fire barrier.[5]

The final rule thus precluded the industry's use of combinations of protective features for redundant circuits, which had long been approved, even encouraged, by the Commission. The final rule, for example (App. B p. 5), disavowed the use of fire retardant cable coatings, which many licensees had

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[4] Another of the proposed rule's requirements focused on possible fires involving lubrication oil leakage from reactor coolant pumps. To protect against such fires, the proposed rule would have permitted either a suppression system designed to extinguish such fires as might occur, or a collection system designed to channel and collect in a safe place such oil as might leak from the pumps (App. C p. 35).

[5] The rule provides that if a licensee's redundant circuits do not meet at least one of these three criteria, the licensee must install an independent alternative or dedicated shutdown system (section III.G.3, App. B p. 42). If a licensee, despite having complied with all previously applicable requirements, cannot meet any of the foregoing, it would be subject to enforcement action, including suspension or revocation of license. 10 C.F.R. §50.100.

employed, several at the request of the Commission's staff.[6]

The practical effect of this new section III.G of the final rule was not simply to forbid the use of protective features other than the separation criteria there prescribed. The final rule enforced these criteria for all operating plants, regardless of prior licensee plant modifications and NRC approval of such modifications for redundant circuit protection (App. B pp. 5-6). Thus, section III.G rendered meaningless licensees' substantial engineering, construction, and financial investments in plant analyses and modifications performed over several years at the NRC's direction. Despite these impacts, the Commission provided no opportunity for public comment on the final rule's new, prescriptive criteria, and provided only a cryptic explanation of the reason for the change.[7]

The final rule included an additional element, on which the court of appeals relied in affirming the rule. If a licensee

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[6] With regard to the reactor coolant pump lubrication oil fire hazard, the NRC in the final rule discarded the option of a suppression system, making mandatory the installation of a collection system (App. B p. 55).

[7] The NRC prescribed a standard methodology for evaluating nuclear plant fire protection programs in 1976. As described by the court of appeals (App. A pp. 5-6), the methodology involved postulating a credible fire in each fire area in the plant under review, and analyzing the effects of the postulated fire on redundant circuits in the area, taking into consideration numerous factors. If the analysis indicated the need for additional protection, the licensee modified the plant accordingly, selecting from among various protective techniques that had been approved by the Commission.

The NRC disowned its methodology in the final rule, although the proposed rule's provision for redundant circuits was based on it. The Commission's complete explanation for the change, without reference to any material in the record, was that "[b]ecause it is not possible to predict the specific conditions under which fires occur and propagate, the design basis protective features are specified rather than the design basis fire" (App. B pp. 15-16). At a stroke, the Commission thus jettisoned an approach that it had developed and upon which the industry had relied for years. The Commission did not further explain its conclusion that, in essence, "it is not possible" to postulate fires at nuclear plants.

believed that plant modifications required by the rule "would not enhance fire protection safety in the facility or that such modifications may be detrimental to overall facility safety" (App. B p. 34), then the licensee could apply to the Commission for an exemption from the relevant requirement.

In the court of appeals,[8] petitioners contended that the Commission's substitution of new and rigid criteria for the flexible approach of the proposed rule without a further comment period was arbitrary and capricious.[9] The court acknowledged that in the final rule the NRC "abandoned" the approach it had taken in the proposed rule (App. A pp. 6-7), but concluded that the proposed and final rules were "sufficiently similar" (App. A p. 14) that renoticing the rule was not required. The court based its conclusion of similarity on the rule's exemption procedure, with which "the practical impact of the final rules is very similar to what it would have been if the proposed rules had gone into effect" (App. A p. 14). To achieve this practical impact, the court, rather than remand to the Commission, itself resurrected the "abandoned" flexible fire hazards methodology, and elevated it to the status of "a fourth alternative" to the three requirements of section III.G (App. A pp. 16-17). Relying on interpretations offered by NRC counsel at oral argument, the court read the proposed and final rules' requirements to be "functionally the same" (App. A p. 17). In short, it was the court of appeals' judgment that no matter how fundamental the Commission's changes in the final rule, licensees could not complain because, the court assumed, problems created by the rule's new requirements could be addressed in the exemption process.

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[8] Section 189 of the Atomic Energy Act, 42 U.S.C. §2239, provides for judicial review of NRC rules as prescribed by Section 10 of the Administrative Procedure Act, 5 U.S.C. §§701-706. 28 U.S.C. §2342(4) gives the courts of appeals exclusive jurisdiction to review Commission rules.

[9] Petitioners also contended that the Commission's determination in the final rule that a collection system is the only acceptable means for protecting the coolant pump lubrication oil required renotice. The court of appeals found the "final rules were simply more stringent versions of the proposed rules" (App. A p. 15).

Petitioners also argued in the court of appeals that the Commission failed to provide an adequate basis for either its decision to limit redundant circuit protective features to three design criteria, or for the three criteria themselves.[10] Observing that "the Commission has come close indeed to requiring this court to search dusty attic corners of the record to bring to light an adequate rationale" (App. A p. 19), the court found only "some record support" for the section III.G requirements (App. A p. 19). Other aspects of the Commission's decision on this subject, such as the refusal to give credit for fire retardant coatings, the court found to be insufficiently supported by the record (App. A p. 20). Again, however, the court excused these deficiencies by relying on the availability of exemptions (App. A pp. 20-21):

> In light of the fact that the exemption procedure will allow power plants to show that alternative measures provide equivalent safety protection, we find that the record provides sufficient support * * *.
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> * * * * *
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> The exemption procedure, however, indicates that the Commission did not intend to limit protective measures * * *.
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> * * * * *
>
> Once again, however, the exemption procedure is crucial.

Thus, although the court of appeals' "decision to uphold the NRC's adoption of the fire protection program [was] reluctant" (App. A p. 23) because the Commission's procedures were inadequate, those inadequacies, in the court's view, were cured because licensees could apply for exemption from the rule's requirements.

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[10] With regard to the lubrication oil fire hazard issue, petitioners challenged the justification for allowing only a collection system. The court of appeals concluded that "the Commission's rationale does not mandate the conclusion that a suppression system could never be as effective as a collection system . . ." (App. A p. 21). The court permitted the provision to stand, however, because licensees could seek exemptions from its requirements.

REASONS FOR GRANTING THE WRIT

This case of first impression presents a question of importance to the administrative process and is of vital concern to petitioners. The costs to petitioners and their ratepayers for compliance with the challenged aspects of the rule will be tens of millions of dollars per unit, according to affidavits filed with the Commission in connection with petitioners' application for a stay before that body.[11]

The court of appeals disapprovingly referred to administrative agencies' practices of not readily disclosing the materials on which they rely, but rather requiring those whom the agency regulates to "play hunt the peanut" (App. A p. 10). That phrase might be equally applied to the adequacy of the support for the challenged requirements. A fair reading of the court of appeals' decision is that while the identification of technical materials relied upon by the agency barely satisfied disclosure requirements,[12] the substance of those materials as justification for the rule's requirements was insufficient in the absence of an exemption procedure.[13] The exemption procedure, however, does not require the agency to substantiate challenged aspects of the rule; rather, it requires the regulated industry to propose an alternative which is "just as good" as the agency requirement, the validity of which itself has never been tested, much less established. If the "peanut" in this case is a tested and validated technical basis for the rule, it remains hidden under the rationale of the court of appeals.

The idea that the availability of exemption may be relied on to salvage the otherwise unsubstantiated requirements

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[11] Review is not sought in this Court of either the agency's denial of the stay or the court of appeals' similar action.

[12] The court of appeals found that "[t]he notice of proposed rulemaking was cursory and gave the industry the minimum acceptable opportunity to respond" (App. A p. 23).

[13] In its conclusion, the court of appeals stated: "The agency's statement of the basis for the program in its final form provided limited technical guidance indeed. * * * Nonetheless, this is a case in which the rule as tempered by the exemption procedure must be upheld" (App. A p. 23).

of a rule, and furthermore may excuse procedural errors committed by the agency in the rule's formulation, is contrary to the requirements of the Administrative Procedure Act and decisions of this Court.

I. The Procedural Requirements Established by the Administrative Procedure Act for Promulgation of Regulations Cannot be Excused Merely Because an Exemption is Available.

Section 4 of the Administrative Procedure Act, 5 U.S.C. §553, prescribes the procedures to be followed by administrative agencies in notice and comment rulemaking. These procedures, at a minimum, impel agencies to give reasonable notice of the terms or substance of proposed regulatory requirements, to provide an opportunity for written comment, to consider the relevant and material matter presented, and to include in the final rule a statement of its basis and purpose. 5 U.S.C. §553(c). Agencies can depart from these procedural requirements only in the limited circumstances specified in section 4(b), which provides that agencies may dispense with notice, comment, and a concise statement of basis and purpose where it promulgates interpretive rules, policy statements, procedural rules or for good cause finds "that notice and public procedure thereon are impracticable, unnecessary, or contrary to the public interest." 5 U.S.C. §553(b). No such statutory exception was invoked in this case. Nonetheless, the court of appeals' decision creates a judicial exception to the requirements of section 4, where an administrative agency provides an exemption procedure to a rule. Under the court's reasoning, an agency's departure from statutory procedural requirements will be ratified, so long as an exemption provision exists.

In *United States* v. *Florida East Coast Ry. Co.*, 410 U.S. 224 (1973), the Court adverted to the requirement that an agency proposing a rule adequately apprise persons to be affected of the nature and content of the rule. *Id.* at 242-43. In this case, as noted, the court of appeals acknowledged there were fundamental changes between the proposed and final rules, but concluded that "with the exemption provision

the practical impact of the final rules is very similar" to the impact of the proposed rule (App. A p. 14).[14]

The APA also requires that rules include a "concise general statement of * * * basis and purpose." 5 U.S.C. §553(c). The court of appeals had great difficulty in divining the rationale and bases for the final rule and, in fact, found a lack of support for some of its requirements. The court wrote, for example, in regard to one alternative rejected by the Commission, that "the technical material is insufficient to support the conclusion that a protective system including fire retardant coatings could never be as effective as the three methods" prescribed for cable separation in the final rule (App. A p. 20). The court of appeals specifically relied on the rule's exemption feature to excuse the NRC's failure to provide a basis for the rule's requirements. Indeed, the court elevated the exemption procedure to the status of an alternative tantamount to the three design criteria adopted by the NRC in the final rule.[15]

There is no authority in the APA or in judicial decisions to support an agency's departure from statutory rulemaking requirements simply because the final rule provides an exemption procedure. Such a doctrine would undermine the very certainty and regularity in the administrative process that section 4 of the APA was designed to promote.

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[14] The court of appeals' determination that an exemption based on the "postulated hazards" approach was an alternative equivalent to the other three requirements makes little sense, in view of the fact that the Commission rejected the postulated hazards approach of the proposed rule in favor of the three limited criteria of the final rule. Absent Commission approval of such approach, the court of appeals had no basis on which to make such a holding; rather, a remand to the Commission was required.

[15] In assigning great importance to the exemption procedure, the court of appeals drew heavily on representations made to the court at argument by counsel for the Commission (App. A p. 17). Neither counsel's understanding of the rule nor the conclusions drawn from them by the court appear or are even fairly suggested by the rule itself. Judicial review should not rely on "post hoc" rationalizations, *Burlington Truck Lines, Inc.* v. *United States*, 371 U.S. 156, 168-69 (1962), "which have traditionally been found to be an inadequate basis for review." *Citizens to Preserve Overton Park* v. *Volpe*, 401 U.S. 402, 419 (1971). *See also Camp* v. *Pitts*, 411 U. S. 138, 142 (1973).

The court of appeals' decision is an invitation to agencies to cut corners in notice and comment rulemaking. If accepted, the invitation will encourage the establishment of ill-considered and arbitrary regulatory requirements.[16] Under the court of appeals' holding, an agency need not, so long as it provides for exemptions, adhere to the APA and case law which require that it describe its proposals in sufficient detail to permit meaningful comment, and give further notice if it makes fundamental changes in the final rule. 5 U.S.C. §553(c); *see Florida East Coast*, 410 U.S. at 242-43; *Morgan* v. *United States*, 304 U.S. 1, 18-19 (1938). If an agency can rely on an exemption procedure to mitigate difficulties that a rule may create for persons affected, it need not consider relevant comments on a proposed rule. Section 4(c) of the APA, however, requires such consideration. *See also Home Box Office, Inc.* v. *FCC*, 567 F.2d 9, 35-36 (D.C. Cir.), *cert. denied*, 434 U.S. 829 (1977). Lastly, as here, an agency need not provide a basis for the requirements in a rule, *United States* v. *Allegheny-Ludlum Steel Corp.*, 406 U.S. 742, 746 (1972). Indeed, in this case the agency was relieved of the necessity for providing the basis for the rule, while at the same time the burden has been shifted to the industry to provide a basis for "equivalence" to the rule's requirements through the exemption process.[17]

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[16] Such precedent could have a significant effect on the administrative process. Agencies commonly provide for exemptions from substantive regulations. The NRC itself has established a general exemption procedure for any requirement of its licensing regulations. 10 C.F.R. §50.12. *See also, e.g.*, 14 C.F.R. §§11.25, 11.43 (Federal Aviation Administration), 14 C.F.R. §§207.16, 221.200 (Civil Aeronautics Board), 17 C.F.R. §32.4 (Commodity Futures Trading Commission), 18 C.F.R. §290.601 (Federal Energy Regulatory Commission), 39 C.F.R. §3001.22 (Postal Rate Commission), 49 C.F.R. §§210.19, 211.41-.43 (Federal Railroad Administration).

[17] The court of appeals apparently embraced Commission counsel's view that the licensees have the burden of showing equivalent protection to qualify for an exemption (App. A p. 17). The court thus relieved the Commission from the burden of justifying its requirements at any point. Whatever the burden may be on a utility to qualify for an exemption, surely the NRC itself has a responsibility to substantiate the requirements to which such exemptions are addressed.

Agencies are generally authorized to provide for exemptions, waivers, or special relief from rules of generalized applicability. *See, e.g., FCC* v. *National Citizens Committee for Broadcasting*, 436 U.S. 775, 788 (1978); *Permian Basin Area Rate Cases*, 390 U.S. 747, 764 (1968). But that authority does not imply that, in providing for such relief from a rule, the agency can escape its duty to justify or support the requirements of the rule as provided by law. To allow the exemption to justify the rule, as the court of appeals has done here, exalts an apparent opportunity for relief above a meaningful rulemaking process, and invites agencies to resort to pre-APA practices when the formulation of agency rules was not subject to meaningful public scrutiny. *See* 1 K. DAVIS, ADMINISTRATIVE LAW TREATISE §1.7, at 21 (2d ed. 1978).

II. The Court of Appeals' Decision Is Inconsistent With Established Standards of Judicial Review.

Section 10(e) of the APA, 5 U.S.C. §706, as relevant here, provides that the court reviewing agency action shall hold such action unlawful to the extent such action is "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law". In reviewing agency action under section 10(e), the courts may not substitute their judgment for that of the agency either on procedural matters, *FCC* v. *Schreiber*, 381 U.S. 279 (1965), or on substantive decisions, *NLRB* v. *Pittsburgh S.S. Co.*, 340 U.S. 498 (1951). Proper application of these standards should result in remand to the agency of a rule unsupported by the rulemaking record. Here, the court of appeals did not conduct its review of the NRC's fire protection rule in accordance with section 10(e), but undertook to rewrite the rule.

The proposed rule, for example, provided that licensees could utilize combinations of features to protect redundant circuits, including the use of fire retardant coatings. In the final rule, the Commission prescribed three criteria for cable separation and discarded all other alternatives, including the use of cable coatings (App. B pp. 5-6). The court of appeals, however, labeled the Commission's statement that it would not approve the use of coatings "mere mischievous dictum"

(App. A p. 21) and asserted that despite the NRC's plain statement to the contrary, licensees may qualify for exemptions on the basis of fire retardant coatings, among other features (App. A p. 21).

If, as the court concluded, "the technical material is insufficient to support the conclusion that a protective system including fire retardant coatings could never be as effective as the three methods allowed by the Commission for the protection of safe shutdown capacity," (App. A p. 20), then the process of review should end and the rule be remanded to the Commission. If neither the NRC's decision to limit protective features exclusively to three criteria, nor the three criteria themselves, were independently supported, as the court of appeals found (App. A pp. 19-21), then the court of appeals improperly took the further step of justifying the three criteria by virtue of the exemption provision.

The Commission's actions must "stand or fall on the propriety of [its] finding[s]," *Camp* v. *Pitts*, 411 U.S. 138, 143 (1973), and not on some new formulation of what the Commission might have said, might have intended, or might have provided in the final rule, but did not. *See also Overton Park*, 401 U.S. at 419-20; *SEC* v. *Chenery Corp.*, 318 U.S. 80, 87 (1943).

CONCLUSION

The petition for a writ of certiorari should be granted.

Respectfully submitted,

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June 14, 1982

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PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

APPENDIX

APPENDIX A

OPINION OF THE U. S. COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT
(Filed March 16, 1982)

United States Court of Appeals

FOR THE DISTRICT OF COLUMBIA CIRCUIT

No. 81-1050

THE CONNECTICUT LIGHT AND POWER COMPANY, ET AL., PETITIONERS

v.

NUCLEAR REGULATORY COMMISSION, RESPONDENT

CAROLINA POWER AND LIGHT COMPANY, INTERVENOR

Petition for Review of an Order of the Nuclear Regulatory Commission

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Argued January 29, 1982

Decided March 16, 1982

James Michael McGarry, III, with whom *McNeill Watkins II* was on the brief for appellant, and entered appearances for intervenor.

Sheldon L. Trubatch, Attorney, Nuclear Regulatory Commission, with whom *Anne S. Almy* and *Martin Green,* Attorneys, Department of Justice, and *Stephen F. Eilperin,* Solicitor, Nuclear Regulatory Commission, were on the brief for respondent. *Harvey J. Shulman* and *G. Paul Bollwerk, III,* also entered appearances for respondent.

Bills of costs must be filed within 14 days after entry of judgment. The court looks with disfavor upon motions to file bills of costs out of time.

Before: WALD, MIKVA and GINSBURG, *Circuit Judges*.

Opinion for the Court filed by *Circuit Judge* MIKVA.

MIKVA, *Circuit Judge*: Connecticut Light and Power Company ("Connecticut Light" or "Company") challenges a decision by the Nuclear Regulatory Commission ("NRC" or "Commission") to adopt a stringent fire protection program for nuclear power plants in service before January 1, 1979, 10 C.F.R. § 50.48, App. A, App. R (1980). In the wake of a damaging fire at the Browns Ferry Nuclear Power Plant, a 1976 Commission report recommended improved fire protection standards for operating nuclear power plants.[1] Based on the *Browns Ferry Report*, the Commission developed technical guidelines for evaluating the fire safety of both new and operating nuclear plants.[2] Because of the extensive problems involved in redesigning a nuclear plant already built and in service, the guidelines for operating plants differed from those for plants not completed. For several years after the promulgation of the guidelines, Commission staff pursued the approach of evaluating the safety of operating plants by applying the guidelines on a plant by plant basis. In a number of cases, the evaluation process resulted in fire protection programs acceptable

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[1] NUCLEAR REGULATORY COMMISSION, RECOMMENDATIONS RELATED TO BROWNS FERRY FIRE (1976), Joint Appendix (J.A.) 13 (hereinafter *Browns Ferry Report*). The Browns Ferry fire was ignited by a candle that a workman was using to inspect for air leaks. The fire caused considerable damage to the plant, and rendered the emergency core coolant system for one of the plant units temporarily inoperable. Danger to the public was averted because back up systems were able to shut down the unit safely. Nonetheless, the fire raised serious concerns about the adequacy of fire prevention practices and fire control measures at nuclear power plants.

[2] AUXILIARY POWER CONVERSION SYSTEMS BRANCH, NUCLEAR REGULATORY COMMISSION, BRANCH TECHNICAL POSITION 9.5-1, Appendix A (1976), J.A. 74-96 (hereinafter *Branch Technical Position 9.5-1*).

to both Commission staff and the plants in question. Disagreements persisted, however, on some issues that were common to a number of plants. As a result, some five years after the Browns Ferry fire the Commission decided to embark on the rule-making challenged here. *Notice of Proposed Rule-Making*, 45 Fed. Reg. 36,082 (May 29, 1980).

Connecticut Light and Power Company, licensed by the Commission to operate nuclear generating plants, objects to a number of features of the Commission's adoption of the fire protection program. First, Connecticut Light contends that the notice of proposed rule-making was inadequate because it gave no indication of the technical basis on which the Commission had relied in formulating the proposed rules and because the rules as adopted differed in major respects from the rules proposed in the notice. In this connection, Connecticut Light also complains that the Commission allowed only thirty days for comment, the statutory minimum for notice and comment rule-making, 5 U.S.C. § 553(d) (1976), a period Connecticut Light contends was inadequate given the complexity and relatively innovative character of the rules at issue here. Second, Connecticut Light argues that the Commission failed to offer an adequate technical justification for the fire protection rules in the form in which they were ultimately adopted. Finally, Connecticut Light claims that the Commission failed to comply with its own regulations governing the imposition of new requirements for nuclear plants already in service.[8]

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[8] Connecticut Light also makes the blanket contention that the NRC should not have employed notice and comment rule-making at all for the fire protection program, but should have continued to treat the problem of fire protection for plants already in service on a plant by plant basis. This contention does not merit separate treatment. The NRC's authority to engage in notice and comment rule-making to set safety standards for nuclear power plants is clear. 42 U.S.C. §§ 2201(i), 5841(f) (1976); 10 C.F.R. §§ 2.800 to 2.808 (1980). If in-

We affirm the fire protection regulations as adopted by the Commission. The administrative record contains adequate support for the Commission's determination that adoption of the rules was urgently needed to protect the public safety. We cannot conceal, however, our concerns about some of the procedures followed by the Commission in the rule-making process by which the program was adopted. The Commission complied but barely with the procedures mandated by the Administrative Procedure Act for notice and comment rule-making, 5 U.S.C. § 553 (1976).

The process of notice and comment rule-making is not to be an empty charade. It is to be a process of reasoned decision-making. One particularly important component of the reasoning process is the opportunity for interested parties to participate in a meaningful way in the discussion and final formulation of rules. *Ethyl Corp. v. Environmental Protection Agency*, 541 F.2d 1, 48 (D.C. Cir.) (*en banc*), *cert. denied*, 426 U.S. 951 (1976). The procedures followed by the NRC here came perilously close to foreclosing any useful participation whatsoever during the rule-making process itself.

An equally important component of the process of reasoned decision-making is the agency's own explanation for the rules it adopts. While an agency need not justify the rules it selects in every detail, it should explain the general bases for the rules chosen. Such explanations help assure public confidence in the rule-making process. Disclosure of the agency's rationale is particularly important in order that a reviewing court may fulfill its statutory obligation to determine whether the agency's choice of

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deed the NRC has presented adequate justification for applying the fire protection program to all operating nuclear power plants, its decision to employ rule-making cannot be regarded as an abuse of discretion, particularly given the fact that safety issues common to a number of plants remained unresolved more than five years after the Browns Ferry Fire.

rules was arbitrary or capricious, 5 U.S.C. § 706(2)(A) (1976); *Ethyl Corp.*, 541 F.2d at 34. The NRC has not made our task on review easy. If the Commission had provided any less in the way of reasoned explanation for the fire protection program selected, we would be compelled to remand the program to the NRC.

I. The Fire Protection Program

The NRC proposed and adopted a comprehensive program to prevent, detect, control, and extinguish fires in operating nuclear power plants. Although the program includes a number of specific requirements debated in the plant evaluations that followed the Browns Ferry fire, three specific parts of the program are challenged in this appeal. They are the methodology mandated for protecting duplicate systems to shut down reactor units safely in case of fire, the requirements for the design of alternative shutdown mechanisms when needed as a substitute for duplicate systems, and the method stipulated for protecting the lubrication system for the reactor's coolant pump.

In most cases in a nuclear power plant, it is possible to design duplicate systems for shutting down reactor units in case of an emergency such as a fire. The duplicate system is provided as a back-up, in case the primary shutdown system should be damaged or destroyed. It is thus especially important to ensure that the duplicate shutdown system cannot be damaged by whatever emergency disables the primary shutdown system.

In the plant by plant evaluations after the Browns Ferry fire, and in the notice of proposed rule-making, the Commission followed a "postulated hazards" approach to the protection of duplicate safe shutdown capacity. On this approach, a plant's protection of such redundant shutdown capacity is tested by reference to a number of factors. In the fire protection program as proposed, these factors included the likely area within which a fire might

spread, the fire extinguishing system used in the area, the accessibility of the area to fire fighters and equipment, the relative fire danger in the area, the availability of alternative methods for shutting down the reactor unit safely, and the fire retardant capacity of protective devices such as fire retardant coatings. 45 Fed. Reg. 36,087 (1980). Pursuant to these guidelines, NRC staff had approved the methods used to protect duplicate shutdown capacity in a number of nuclear plants in service before January 1979. The final rule adopted by the Commission, however, abandoned the postulated hazards approach. In its stead, the Commission stipulated three approved methods for protecting duplicate shutdown capacity. These are: separation of the redundant system by a barrier able to withstand fire for at least three hours; separation of the redundant system by a distance of twenty feet containing no intervening combustible material, together with fire detectors and an automatic fire suppression system; and enclosure of the redundant system in a fire barrier able to withstand fire for one hour, coupled with fire detectors and an automatic fire suppression system. 10 C.F.R. § 50, App. R, III.G.2 (1980). These methods give no credit for fire retardant coatings and do not consider the relative fire danger of the area in which the redundant shutdown system is located.

In some cases, it is also necessary to provide alternative shutdown capacity in order to protect the reactor unit in case of fire. For example, it may be impossible to redesign an operating plant in order to protect a duplicate shutdown system adequately. To protect the public safety, alternative shutdown systems must be protected against damage, just as redundant shutdown systems must be. The Commission proposed a postulated hazards approach to the evaluation of alternative shutdown capacity, under which a plant was to be required to show it could protect at least one means for shutting down the plant from damage for at least seventy-two

hours following a fire. *Notice of Proposed Rule-Making*, 45 Fed. Reg. 36,089 (May 29, 1980).

The final rules adopted by the Commission, however, abandoned the postulated hazards approach to the protection of alternative shutdown capacity. Instead, the final rules stipulated that alternative shutdown capacity must be protected by one of the methods acceptable for the protection of redundant shutdown capacity. 10 C.F.R. § 50, App. R, III.G.2 (1980). In addition, the Commission continued to require that one back up method for ensuring safe shutdown in case of fire should be able to remain operable for at least seventy-two hours following a fire. *Id.* § 50, App. R. III.L.1. One important aspect of this requirement is that the back up method should be sufficiently isolated from associated electrical circuitry to prevent damaged circuits from spreading a continuing fire into the back up system. *Id.* § 50, App. R. III.L.7. It may be especially difficult and expensive to redesign operating nuclear power plants to meet this last provision.

The third aspect of the fire protection program challenged here concerns the protection of lubricant for the reactor's coolant system. The lubrication oil in the reactor's coolant system must be protected in order to protect the coolant system, and ultimately the reactor itself. Because the oil is flammable, however, it poses a significant fire hazard. The NRC originally proposed two acceptable methods for protecting the lubricant: an oil collection system, which drains the pump lubricant away from the reach of the fire; and an automatic fire suppression system, which attempts to put out the fire before it can reach the lubricant. *Notice of Proposed Rule-Making*, 45 Fed. Reg. 36,090 (May 29, 1980). During the process of plant by plant evaluation that preceded the rule-making, NRC staff had approved fire suppression systems for protecting the lubricant in a number of

plants.[4] The Commission, however, concluded that only an oil collection system could sufficiently protect the coolant pump lubricant from fire. The final rule, therefore, stipulates only one method for protecting the lubrication oil: an oil collection system. 10 C.F.R. § 50, App. R, III.O (1980).

This rule-making followed an extensive process of plant by plant evaluations that had culminated in NRC staff approval of entire fire protection programs at many nuclear power plants and of important portions of such programs at others. Even so, the original notice of proposed rule-making contained no indication of whether plants would be required to alter approved features to comply with the new regulations. The final rule specified that most of the particular requirements would not be imposed upon plants that had received staff approval of features before the effective date of the new rule. 10 C.F.R. § 50.48(b) (1980). Three particular requirements, however, were to be applied to all nuclear plants operating before January 1, 1979, regardless of whether they had received staff approval of these aspects of their fire protection program. *Id.* These include the portions of the fire protection program challenged here: the standards for protecting duplicate and alternative safe shutdown capacity and the method for protecting the reactor coolant pump lubricant.[5]

The final rules, however, contain an additional, critical element of flexibility. Within thirty days of the rules'

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[4] An example is the Robinson 2 unit, owned by Carolina Power & Light Company. Carolina Power and Light is an intervenor in this lawsuit. Its brief explains in great detail how the fire protection program as finally adopted by the NRC may require operating plants to make changes beyond those already undertaken at the direction of NRC staff during the plant by plant evaluation process.

[5] They also include an emergency lighting requirement not challenged here. 10 C.F.R. § 50.48(b) & App. R, III.J (1980).

effective date, licensees were allowed to apply for exemptions from any aspect of the fire protection program, including those requirements applied to plants in spite of prior staff approval of protection systems that did not conform to the new rules. *Id.* § 50.48(c)(6). Implementation of the new rules is tolled pending final Commission action on the exemption request. *Id.* Exemptions are to be granted by the Commission upon a showing by the licensee that the required plant modification "would not enhance fire protection safety in the facility or that such modifications may be detrimental to overall facility safety." *Id.* Apparently a number of such exemption requests were filed within the time provided and are now under consideration by the NRC. Final decisions by the NRC on the exemption requests will themselves be subject to judicial review, 5 U.S.C. § 702 (1976).

II. The Adequacy of the Notice of Proposed Rule-Making

A. *Disclosure of the Technical Basis for the Proposed Rules.* The Administrative Procedure Act requires an agency engaged in informal rule-making to publish a notice of proposed rule-making in the Federal Register that includes "either the terms or substance of the proposed rule or a description of the subjects and issues involved." 5 U.S.C. § 553(b)(3) (1976). Connecticut Light's most serious complaint about the notice of proposed rule-making here is that it failed to indicate or explain the technical basis on which the Commission had relied in selecting the proposed rules.

The purpose of the comment period is to allow interested members of the public to communicate information, concerns, and criticisms to the agency during the rule-making process. If the notice of proposed rule-making fails to provide an accurate picture of the reasoning that has led the agency to the proposed rule, interested parties will not be able to comment meaningfully upon the

agency's proposals. As a result, the agency may operate with a one-sided or mistaken picture of the issues at stake in a rule-making. In order to allow for useful criticism, it is especially important for the agency to identify and make available technical studies and data that it has employed in reaching the decisions to propose particular rules. To allow an agency to play hunt the peanut with technical information, hiding or disguising the information that it employs, is to condone a practice in which the agency treats what should be a genuine interchange as mere bureaucratic sport. An agency commits serious procedural error when it fails to reveal portions of the technical basis for a proposed rule in time to allow for meaningful commentary.[6]

The notice proposing the fire protection program made little reference to technical material. It referred only to the *Browns Ferry Report* and to the guidelines laid down in *Branch Technical Position 9.5-1* and employed in the

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[6] *Sierra Club v. Costle*, 657 F.2d 298, 397 n.484 (D.C. Cir. 1981); *National Crushed Stone Association v. EPA*, 601 F.2d 111, 117 (4th Cir. 1979), *reversed on other grounds*, 449 U.S. 64 (1980); *United States v. Nova Scotia Food Products Corp.*, 568 F.2d 240 (2d Cir. 1977); *Home Box Office, Inc. v. FCC*, 567 F.2d 9, 55 (D.C. Cir.), *cert. denied*, 434 U.S. 829 (1977); *Portland Cement Association v. Ruckelshaus*, 486 F.2d 375, 392 (D.C. Cir. 1973), *cert. denied*, 417 U.S. 921 (1974). *See also Aqua Slide 'N' Dive Corp. v. Consumer Product Safety Commission*, 569 F.2d 831, 838 (5th Cir. 1978) (failure to subject technical material to adversarial comment affects weight that may be accorded the material by reviewing court). *Cf. FCC v. WNCN Listeners Guild*, 450 U.S. 582, 591 n.22 (1981) (failure to disclose a staff study on the effectiveness of market allocation mechanisms in accommodating diversity "even if a procedural lapse, [not] . . . a sufficient ground for reopening the proceeding before the Commission.") Because we find that the Commission did provide minimally sufficient indication of the technical materials upon which it relied here, we need not reach the issue of whether a given set of omissions is a procedural lapse serious enough to warrant a remand to the agency.

plant by plant safety evaluations. 45 Fed. Reg. 36,082 (May 29, 1980). Otherwise, the Commission asserted that "[t]he position of the staff and the licensees regarding the provisions of this rule is documented and well known." *Id.*

Connecticut Light contends to the contrary that the Commission's position was not well-known at all. Some technical papers relied upon by the Commission, Connecticut Light asserts, were either not public or were not identified as relevant by the Commission until long after the comment period had closed.[7] Utilities wishing to comment on these technical studies, the Company argues, would thus have either been unable to review some relevant documents, or would have faced the situation of having to guess which of a myriad of entries in the Commission's public documents room has played an important role in the development of the fire protection program.

The Commission's belief that its position was well-known was not entirely unreasonable. It was based in the

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[7] Connecticut Light's position here is fueled by the NRC itself. In an opinion denying a motion by several nuclear power plant licensees for a stay of the portions of the fire protection program challenged here, the NRC justified the fire protection program by reference to a range of technical material and staff documents. *Memorandum and Order* No. CLI-81-11 (NRC June 12, 1980). At oral argument, NRC counsel specifically represented to the court that the experience accumulated during the plant by plant evaluations, together with the Sandia test results listed in note 8 *infra*, were the most important bases of the rule as proposed. Both final safety reports and the communications that took place during their development are in the NRC public documents room. So are the relevant Sandia reports. In this opinion, therefore, we consider only whether the accumulated experience of the safety evaluations of individual plants, the Sandia reports, the *Browns Ferry Report*, *Branch Technical Position No. 9.5-1*, and the comments submitted to the Commission during the comment period, provide adequate justification for the rules as finally adopted by the Commission.

first instance on the wide circulation of the *Browns Ferry Report* and *Branch Technical Position 9.5-1*. Indeed, Connecticut Light does not contest the availability or importance of these documents in this appeal. The Commission also contends that it relied heavily on the safety evaluations that had been prepared by NRC staff during the plant by plant evaluation process. These safety reports were on file in the NRC public documents room during the comment period. Of course, it would be unfair to charge one utility with knowledge of the details of what went on during a safety review of another utility's nuclear power plants. The NRC, however, did not assume that the utility companies had or should have shared information developed in individualized safety reviews. Instead, it relied on the utilities' *common* knowledge of problems that had recurred in plant after plant and of reports that had been publicly filed. There was in fact a common store of experience on which the NRC drew, that had been developed and accumulated in interaction with the utilities during the five-year period that followed the Browns Ferry fire.

Finally, the Commission did rely on some technical studies that were not mentioned in the notice of proposed rule-making. Two sets of studies made by Sandia Laboratories, both important to the development of the proposals for protecting duplicate and alternative shutdown capacity, are paramount examples of this.[8] These studies concerning the effectiveness of separation distances in preventing fire from spreading from one set

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[8] Sandia Laboratories, *A Preliminary Report on Fire Protection Research Program* (July 6, 1977 Test), No. SAND 77-1424 (October, 1977), J.A. 123; Sandia Laboratories, *A Preliminary Report on Fire Protection Research Program—Fire Retardant Coatings Tests* (December 7, 1977-January 31, 1978), No. SAND 78-0518 (March 1978), J.A. 287; Sandia Laboratories, *A Preliminary Report on Fire Protection Research Program Fire Barriers and Fire Retardant Coatings Tests*, No. NUREG-CR-0881 (Sept. 1978), J.A. 349.

of cables to another and the usefulness of fire retardant coatings, however, had already been subject to widespread public comment. The separation distance studies were part of the basis of a petition by the Union of Concerned Scientists (UCS) to require the NRC to alter its fire protection standards.[9] They were subject to public comment during the review of the UCS petition and a public memorandum by the NRC staff responded specifically to criticisms of the separations tests submitted during that review.[10] The fire retardant coatings studies, also public, formed part of the basis for a petition for reconsideration by the UCS.

During the comment period, the utilities repeatedly asked the NRC to identify the technical studies upon which the proposed rules were based. The NRC was unhelpful and the comments submitted are noticeably general.[11] Certainly, it would have been better practice for the NRC to have identified these technical materials specifically in the notice of proposed rule-making. Nonetheless, this rule-making process took place against a background of five years during which the Commission explored safety proposals in a public forum and exposed the important technical studies to adversarial comment.[12]

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[9] See J.A. 153, 258.

[10] *NRC Staff Report on Union of Concerned Scientists' Petition for Emergency and Remedial Action* (December 15, 1977), J.A. 260.

[11] *See, e.g.*, Comments of Northeast Utilities, J.A. 538; Comments of Edison Electric Institute, J.A. 563; Comments of Baltimore Gas & Electric Company, J.A. 591.

[12] At oral argument, counsel for the Commission conceded that it would have been reasonable for the Commission to include references to technical data in the notice of proposed rule-making. He contended only that the Commission's failure to do so here should not be fatal to this rule-making because of the extensive background of interaction between licensees of nuclear plants and the Commission in the five years between the Browns Ferry fire and the notice of proposed rule-making itself.

Given this context, we conclude that the technical background of the rules was sufficiently identified to allow for meaningful comment during the rule-making process.

B. *Differences Between the Fire Protection Program as Proposed and as Adopted.* Connecticut Light's second major challenge to the NRC procedures here is that the Commission adopted final rules that differed significantly from the rules announced in the notice of proposed rulemaking. Connecticut Light contends that because of the differences the NRC should have renoticed the changed rules and set a new comment period. Connecticut Light regards three particular changes as crucial: the change from the postulated hazards approach to a list of three acceptable methods for protecting duplicate and alternative shutdown capacity, the decision to give no credit for fire retardant coatings, and the determination that a collection system is the only acceptable means for protecting the coolant pump lubrication oil. We find that the rules as adopted were sufficiently similar to the rules as proposed that renoticing was not required. An important factor in our decision, however, is that with the exemption provision the practical impact of the final rules is very similar to what it would have been if the proposed rules had gone into effect.

An agency adopting final rules that differ from its proposed rules is required to renotice when the changes are so major that the original notice did not adequately frame the subjects for discussion. The purpose of the new notice is to allow interested parties a fair opportunity to comment upon the final rules in their altered form. The agency need not renotice changes that follow logically from or that reasonably develop the rules it proposed originally. Otherwise, the comment period would be a perpetual exercise rather than a genuine interchange resulting in improved rules. *Weyerhaeuser Co. v. Costle*, 590 F.2d 1011, 1081 (D.C. Cir. 1978);

Ethyl Corp. v. Environmental Protection Agency, 541 F.2d 1, 48 (D.C. Cir.) (*en banc*), *cert. denied*, 426 U.S. 951 (1976).[18]

Here, the final rules were a "logical outgrowth" of the rules as proposed. *Weyerhaeuser Co. v. Costle*, 590 F.2d at 1031. The NRC had proposed two methods for protecting coolant pump lubrication oil; the final rule mandated one of these methods, a collection system, because of concern about the flammability of the lubrication oil. The NRC had proposed a method for protecting alternate and duplicate shutdown capacity that included consideration of the effects of fire retardant coatings; the final rule ignored the coatings because of concern about their reliability. With respect to both of these changes, the notice of proposed rule-making clearly revealed both the precise "subject matter" and the "issues" involved as required by the APA, 5 U.S.C. § 553(b)(3) (1976). The final rules were simply more stringent versions of the proposed rules.

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[18] The authorities cited by Connecticut Light in support of its argument that new notice was required in this case all involved major failures to indicate the nature or scope of the final rule adopted. In *Kollett v. Harris*, 619 F.2d 134 (1st Cir. 1980), the notice announced the general subject of income and exclusions from income of persons eligible for Supplemental Security Income benefits, but not the particular topic of the challenged rule, the implementation of the statutory provision concerning the attribution of parental income to children, 42 U.S.C. § 1382c(f)(2) (1976). In *American Standards, Inc. v. United States*, 602 F.2d 256 (Ct. Cl. 1979), the court held that a proposal to compute a deduction for certain trade corporations by the consolidation of taxable incomes did not adequately warn the public that the Treasury intended to include the case in which a corporation had a net loss. *American Iron & Steel Institute v. Environmental Protection Agency*, 568 F.2d 284 (3d Cir. 1977), involved a notice of proposed rule-making that completely failed to indicate that the regulations proposed would apply to a subcategory of the steel industry, the specialty steel segment.

The question is somewhat closer with respect to the change in methods of protecting duplicate shutdown capacity from the postulated hazards approach to the stipulation of the three acceptable alternatives. Connecticut Light contends that it did not have a fair opportunity to comment on the latter approach, because the approach was entirely novel. The NRC replies that it adopted the stipulated alternatives approach because of criticism about the complexity of the postulated hazards approach.[14] It also points out that with the exemption procedure the stipulated alternatives approach is not a major shift in NRC policy.

In explaining the interplay between the adoption of the stipulated alternatives approach and the exemption procedure, the Commission stated:

> Requirements that account for all of the parameters that are important to fire protection and consistent with safety requirements for all plant-unique configurations have not yet been developed. In light of the experience gained in fire protection evaluations over the past four years, the Commission believes that the licensees should reexamine those previously approved configurations of fire protection that do not meet the requirements as specified in Section III.G. to Appendix R. Based on this reexamination the licensee must either meet the requirements of Section III.G. of Appendix R or apply for an exemption that justifies alternatives by a fire hazard analysis.

45 Fed. Reg. 76,603 (Nov. 19, 1980). The practical effect of the exemption procedure is thus to give utilities a fourth alternative: if the company can prove that

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[14] A number of power companies commented unfavorably upon the "excessive detail" of the proposed postulated hazards approach. *See* Comments of Northeast Utilities, J.A. 539; Comments of Yankee Power Company, J.A. 558-59; Comments of Edison Electric Institute, J.A. 576; Comments of Consumers' Power Company, J.A. 587; Comments of Florida Power & Light Company, J.A. 590.

another method works as well as one of the three stipulated by the NRC, in light of the identified fire hazards at its plant, it may continue to employ that method. The NRC at oral argument characterized the final rule as adopted with the exemption provision as "functionally . . . the same" as the postulated hazards approach. As counsel for the NRC explained at oral argument in response to a question about whether the difference between the proposed and final rules was merely one of nomenclature:

> As it works out practically, yes, [the difference is one of nomenclature] because we now have in house these at least forty-four exemption requests for just the one redundant separation part of the rule and the staff will be doing the same kind of review of analyses and the utilities will be doing the same kind of analysis that they would have done under the proposed rule.

Counsel further explained that the postulated hazards approach placed the burden on the utility to show how its protection program could meet likely fire hazards, and the exemption procedure similarly placed the burden on the utility to show that safety would not be enhanced by installing one of the alternatives stipulated in the rule.

Certainly, a rule that continues to allow a proposed approach as an alternative to other stipulated methods may be regarded as the logical successor to the proposed approach. On this basis, we conclude that the NRC was not obligated to renotice the fire protection program when it shifted from reliance on the postulated hazards approach to the stipulated alternatives approach in conjunction with the exemption procedure.

C. *The Thirty-Day Comment Period.* Connecticut Light's final objection to the notice and comment procedures followed by the NRC is that the NRC allowed but a thirty-day comment period, without extension.

Notice of Proposed Rule-Making, 45 Fed. Reg. 36,082 (May 29, 1980). This is the statutory minimum, 5 U.S.C. § 553(d) (1976). The NRC justified thus limiting the comment period because of the extensive background of public comment and open meetings that preceded the rule-making concerning the fire protection program. Connecticut Light, however, objects that the provision requiring the separation of associated circuits in particular was a novel proposal and that members of the industry therefore should have been granted a longer comment period.

We cannot say that the NRC's choice of a comment period was unreasonable. Neither statute nor regulation mandates that the agency do more. While the technical complexity of the regulations is such that a somewhat longer comment period might have been helpful, the NRC had been exploring without complete success the problem of fire protection at nuclear plants with members of the industry for over five years. We shall not gainsay the Commission's conclusion that "it is timely and necessary . . . to state what the minimum fire protection requirements will be in each of these contested areas of concern." 45 Fed. Reg. 36,083 (May 29, 1980).

III. The NRC's Justification for the Final Rules

Under the Administrative Procedure Act, an agency adopting rules by notice and comment rule-making must provide "a concise general statement of [the rules'] basis and purpose." 5 U.S.C. § 553(c) (1976). This statement need not be comprehensive, but it must indicate sufficiently the agency's reasons for the rules selected, so that the reviewing court is not faced with the task of "rummaging" through the record to elicit a rationale on its own. *United States ex rel. Checkman v. Laird*, 469 F.2d 773, 783 (2d Cir. 1972) (Leventhal, J.); *See also American Public Transit Association v. Lewis*, 655 F.2d 1272, 1278 (D.C. Cir. 1981); *Harborlite Corp. v. ICC*,

613 F.2d 1088, 1093 n.9 (D.C. Cir. 1979). In this case, the Commission has come close indeed to requiring this court to search dusty attic corners of the record to bring to light an adequate rationale for the Commission's action.

We are asked here to consider three aspects of the final rule: the methods stipulated for protecting duplicate and alternate shutdown capacity, the refusal to consider fire retardant coatings as protective devices, and the decision to allow only a collection system to protect the reactor coolant pump lubrication oil. As justification for stipulating the three methods of protecting shutdown capacity, 10 C.F.R. § 50, App. R, III.G.2 (1980), the Commission referred to the extreme importance of ensuring safe shutdown capacity in case of fire. It found the postulated hazards approach insufficiently protective because "it is not possible to predict the specific conditions under which fires may occur and propagate." Instead, the Commission decided to proceed on a known basis, the design features of the three protective methods selected. 45 Fed. Reg. 76,606 (Nov. 19, 1980). Finally, the Commission noted that comments had suggested the need to simplify the rule and that adoption of the three methods would certainly provide "clarification" of what was acceptable. *Id.*

The Commission's assertions about the protective capacities of the stipulated methods were not supported by specific reference to technical materials. Such technical guidance would have simplified this court's task on review considerably. Nonetheless, it is fairly clear that the Commission intended to refer generally to the tests of fire propagation among cable systems conducted by Sandia Laboratories.[15] These tests are far from conclusive proof that the three methods stipulated are the only methods capable of protecting safe shutdown capacity. They do, however, provide some record support for the effectiveness

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[15] See note 8, *supra*.

of the methods chosen. In light of the fact that the exemption procedure will allow power plants to show that alternative measures provide equivalent safety protection, we find that the record provides sufficient support for that aspect of the fire protection program applying to shutdown capacity.

The Commission's refusal to include fire retardant coatings as devices for protecting cable systems was based on "some separate effects tests." 45 Fed. Reg. 76,603 (Nov. 19, 1980). These appear to have been the Sandia tests of fire retardant coatings.[16] Once again, the technical material is insufficient to support the conclusion that a protective system including fire retardant coatings could never be as effective as the three methods allowed by the Commission for the protection of safe shutdown capacity in App. R, III.G.2. The Sandia tests conclude that retardant coatings offer varying amounts of cable protection. Moreover, it is by no means clear that the Sandia tests evaluated all of the coatings that are now available.

The exemption procedure, however, indicates that the Commission did not intend to limit protective measures to the three methods stipulated in the rule, 10 C.F.R. § 50, App. R, III.G.2 (1980). If the utility can show that some combination of protective measures provides protection equivalent to that afforded by one of the Commission's three stipulated methods, it will be entitled to an exemption, regardless of whether the combination of measures includes fire retardant coatings. The statement that "based on present information, the Commission

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[16] Sandia Laboratories, *A Preliminary Report on Fire Protection Research Program—Fire Retardant Coatings Tests* (December 7, 1977-January 31, 1978), No. SAND 78-0518 (March 1978), J.A. 287; Sandia Laboratories, *A Preliminary Report on Fire Protection Research Program Fire Barriers and Fire Retardant Coatings Tests*, No. NUREG-CR-0381 (Sept. 1978), J.A. 349.

does not expect to be able to approve exemptions for fire-retardant coatings used as fire barriers," 45 Fed. Reg. 76,609 (Nov. 19, 1980), must therefore be regarded as mere mischievous dictum. Whatever the Commission's present expectations, it must remain open to power companies to show in individual exemption applications that fire retardant coatings in conjunction with other protective means can provide adequate levels of fire protection.

Finally, the Commission allowed only one method for protecting coolant pump lubrication oil, a collection system, 10 C.F.R. § 50, App. R, III.0 (1980). This limitation was justified because of the possibility that uncollected oil might come in contact with hot surfaces, igniting a dangerous and inaccessible fire. 45 Fed. Reg. 76,708 (Nov. 19, 1980). Another inadequacy of the alternative initially proposed by the Commission, a water system for putting out fires in the lubricant, was that such a suppression system might not withstand an earthquake, a possible cause of a power plant fire. *Id.* at 76,609. But the Commission's rationale does not mandate the conclusion that a suppression system could never be as effective as a collection system; it does not, for example, take into account differences in seismic danger for different nuclear plants. Once again, however, the exemption procedure is crucial. Companies such as the intervenor Carolina Power and Light, which had installed a suppression system with approval of the Commission staff, will have an opportunity to show that their system is as protective of the public safety as the system chosen by the Commission.

IV. The Commission's Backfit Regulations

An agency is bound by its own regulations and commits procedural error if it fails to abide by them. *Panhandle Eastern Pipe Line Co. v. FERC*, 613 F.2d 1120, 1135 & n.84 (D.C. Cir. 1979), *cert. denied*, 449 U.S. 889

(1980). The NRC has adopted a specific regulation governing the imposition of structural changes upon nuclear plants for which construction permits have been issued, 10 C.F.R. § 50.109 (1980). Connecticut Light contends that the NRC failed to honor its regulation governing backfitting in promulgating the fire protection program.

We disagree. The NRC's regulations allow backfitting only if the Commission "finds that such action will provide substantial, additional protection which is required for the public health and safety or the common defense and security." *Id.* § 50.109(a). The regulation further provides, "Nothing in this section shall be deemed to relieve a holder of a construction permit or a license from compliance with the rules, regulations, or orders of the Commission." *Id.* § 50.109(b). The NRC interprets the complete regulation to require the additional public safety finding when backfitting is not imposed on power plants through the rule-making process. For example, NRC staff reviews sometimes require backfitting; at oral argument, counsel for the NRC indicated that § 50.109(a) was designed to protect power plants from precipitous staff recommendations. This interpretation of the regulations is sensible. During the rule-making process, the NRC is forced to justify the need for regulations involving backfitting by virtue of the rule-making itself. A further finding on the impact of the regulations on the public safety would be otiose. We therefore adhere to the NRC's construction of its backfit regulations and reject Connecticut Light's contention that the NRC failed to honor the regulations. *See Belco Petroleum Corp. v. FERC*, 589 F.2d 680, 685 (D.C. Cir. 1978) ("When construction of an agency regulation is in issue, courts owe great deference to the interpretation adopted by the agency and will uphold that interpretation if it is reasonable and consistent with the regulation.")

V. Conclusion

Our decision to uphold the NRC's adoption of the fire protection program is reluctant. At almost every step of the way, the NRC's procedures were less than exemplary. The notice of proposed rule-making was cursory and gave the industry the minimum acceptable opportunity to respond. The agency's statement of the basis for the program in its final form provided limited technical guidance indeed. Surely, the NRC is entitled to use its discretion to err on the side of protecting the public safety when it regulates nuclear power plants. If the NRC treats the safeguards of the administrative process in too cavalier a fashion, however, it may be impossible for the reviewing court to discern that its action has indeed furthered the public safety.

Nonetheless, this is a case in which the rule as tempered by the exemption procedure must be upheld. The fire protection program with the exemption procedure is not a radical departure from the program as it was developed after the Browns Ferry fire and as it was originally proposed. With the exemption procedure, power plants will be able to show that alternative fire protection systems protect the public safety at the same high level as the system chosen by the Commission. Their failure to make such showings will only be further proof that the Commission was indeed correct that the public safety urgently required a stringent fire protection program for nuclear power plants.

APPENDIX B

FINAL RULE OF THE NUCLEAR REGULATORY COMMISSION

(Docketed November 17, 1980)

NUCLEAR REGULATORY COMMISSION
10 CFR Part 50

Fire Protection Program for Operating Nuclear Power Plants

AGENCY: Nuclear Regulatory Commission

ACTION: Final Rule

SUMMARY: The Nuclear Regulatory Commission is amending its regulations to require certain provisions for fire protection in operating nuclear power plants. This action is being taken to upgrade fire protection at nuclear power plants licensed to operate prior to January 1, 1979, by requiring resolution of certain contested generic issues in fire protection safety evaluation reports.

EFFECTIVE DATE: February 17, 1981

NOTE: The Nuclear Regulatory Commission has submitted this rule to the Comptroller General for review as may be appropriate under the Federal Reports Act, as amended (44 U.S.C. 3512). The date on which the reporting requirement of this rule becomes effective, unless advised to the contrary, reflects inclusion of the 45-day period that statute allows for such review (44 U.S.C. 3512(c)(2)).

FOR FURTHER INFORMATION CONTACT: David P. Notley, Office of Standards Development, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, phone 301-443-5921 or Robert L. Ferguson, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, phone 301-492-7096.

SUPPLEMENTARY INFORMATION: On May 29, 1980, the Nuclear Regulatory Commission published in the *Federal*

Register (45 FR 36082) a notice of proposed rulemaking inviting written suggestions or comments on the proposed rule by June 30, 1980. The notice concerned proposed amendments to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," which would require certain minimum provisions for fire protection in nuclear power plants operating prior to January 1, 1979. Fifty-one comment letters were received regarding the proposed amendments. A number of comments pertained to specific requirements in the proposed Appendix R, and these will be dealt with below. However, there were three substantive contentions which were raised by many of the commenters. These three comments are summarized as follows:

1. Most commenters stated that the 30-day comment period was too short to permit adequate detailed response and that the comment period should have been extended.

The Commission does not agree. The NRC has been developing fire protection requirements since 1975. The NRC published comprehensive fire protection guidelines, Branch Technical Position BTP APCSB 9.5-1, and its Appendix A in 1976. Licensees have compared their fire protection programs against these guidelines and have discussed their deviations from these guidelines with the NRC staff for the past four years during the NRC's fire protection reviews of operating reactors. A Safety Evaluation Report and, in most cases, supplements to the Safety Evaluation Report, have been issued for each operating reactor. These reports describe fire protection alternatives that have been proposed by the licensee and found acceptable by the staff as well as unresolved fire protection issues remaining between the staff and the licensee. Proposed Appendix R provided the Commission's requirements for resolving those issues. Thus, it concerns only a limited number of issues derived from the use of the earlier guides. The Commission believes that a 30-day comment period was adequate under these circumstances.

2. Many licensees questioned the need for backfitting all the requirements of Appendix R. They commented that they had previously complied with staff fire protection recommendations in "good faith" and have committed to or completed

certain modifications. They contend that the staff has properly determined that these modifications provide at least the level of fire protection described by the guidance contained in Appendix A to Branch Technical Position BTP APCSB 9.5-1. They also contend that these modifications provide a level of protection at least equivalent to that contained in the proposed rule. They express the concern that the proposed rule was written in such specific language that fire protection issues that were thought closed would be reopened and new, but not necessarily better, modifications would be required. These modifications could be accomplished only by the expenditure of considerable engineering, design, and construction effort and at great undue expense. The commenters request that the requirements in the proposed rule be rewritten to specify only the general requirements of what needs to be accomplished.

These comments raise three related issues. The first relates to the need for specific requirements. The general requirements relating to fire protection are already set forth in General Design Criterion 3 of Appendix A to 10 CFR Part 50 and in the NRC guidance documents. These general provisions gave rise to a number of disputes over whether specific methods adequately accomplished the intended goal. The proposed rule is intended to provide sufficient specific guidance to ensure satisfactory resolution of these issues. Thus, reverting to generalized guidance would not accomplish the intended purpose of the proposed rule.

The second issue involved some instances in which the specific wording used resulted in unnecessary and unintended restrictions. For example, the proposed rule called for a "fresh water" supply. For firefighting purposes, brackish water is satisfactory and a "fresh" water supply is unnecessary. Similarly, the proposed rule called for an "underground" yard fire main loop. Often portions of a fire main loop run above ground in and as they enter structures. The Commission had not intended to prohibit running portions of a fire main loop above ground. Other similar changes are discussed in Section III, "Specific Requirements," of this preamble.

The third issue relates to imposition of requirements on plants with presently installed or with existing commitments

to install fire protection features previously determined by the staff to satisfy the guidance of Appendix A to BTP APCSB 9.5-1. The Commission generally agrees that, except for three sections that will be back fitted, Appendix R should not be retroactively applied to features that have been previously approved by the NRC staff as satisfying the provisions of Appendix A to BTP APCSB 9.5-1.

The NRC staff had intended, in its original proposal for Appendix R, that the requirements be applicable only for the resolution of unresolved disputed fire protection features. Thus, the staff had not intended the provisions of Appendix R to require modification of previously approved features. This was not clearly described in the proposed rule as published for comment. In fact, the Supplementary Information published with the proposed rule explicitly indicated that "[a]ll licensees will be expected to meet the requirements of this rule, in its effective form, including whatever changes result from public comments."

In determining whether the specific requirements of Appendix R should be imposed on licensees with presently installed or existing commitments to install fire protection features previously determined to satisfy Appendix A to Branch Technical Position BTP APCSB 9.5-1, it is important to recognize that Appendix R addresses only a portion of the specific items contained in the more comprehensive document, Branch Technical Position BTP APCSB 9.5-1 and its Appendix A. Appendix A to BTP APCSB 9.5-1 has been the basic fire protection guidance used by the staff in their fire protection reviews conducted for all operating plants during the past several years. For many plants, licensees proposed systems and features that satisfactorily achieved the fire protection criteria set forth in Appendix A to BTP APCSB 9.5-1 and began to promptly implement such features and systems.

Satisfactory features and systems are already in place and in operation in many plants. There is a reasonable degree of uniformity among most of these approved features for all facilities since they were reviewed against the same criteria of Appendix A to BTP APCSB 9.5-1. In general, the features

previously approved by the NRC staff in its reviews of fire protection using the criteria of Appendix A to BTP APCSB 9.5-1 provide an equivalent level of fire protection safety to that provided under the specific provisions of Appendix R. Thus, the further benefit that might be provided by requiring that previously approved features be modified to conform to the specific language set forth in Appendix R is outweighed by the overall benefit of the early implementation of such previously approved features, which in many cases are currently being installed.

Nevertheless, as a result of its continuing review of fire protection matters, the NRC staff has indicated to the Commission that there are requirements in three sections in which the protection afforded by Appendix R over and above that previously accepted, may be desirable. The Commission has decided that these requirements should be retroactively applied to all facilities. This decision is not meant to reflect adversely on previous licensee or staff evaluations; rather its purpose is to take fully into account the increased knowledge and experience developed on fire protection matters over the last several years.

The first of these sections is related to fire protection features for ensuring that systems and associated circuits used to achieve and maintain safe shutdown are free from fire damage. Appendix A to BTP APCSB 9.51 permits a combination of fire-retardant coatings and fire detection and suppression systems without specifying a physical separation distance to protect redundant systems (Appendix A, D.1(2)), and such arrangements were accepted in some early fire protection reviews. As a result of some separate effects tests, the staff changed its position on this configuration, and subsequent plants have been required to provide additional protection in the form of fire barriers or substantial physical separation for safe shutdown systems. No credit for such coatings as fire barriers is allowed by Section III.G of Appendix R. Appendix A to Branch Technical Position BTP APCSB 9.5-1 and the proposed Appendix R recognized that there were plant-unique configurations that required fire protection features that are not identical to those listed in Section III.G of Appendix R.

For these cases, fire protection features were developed by the licensee and described in a fire hazards analysis. Some of these arrangements were accepted by the staff as providing equivalent protection to the requirements of Section III.G to Appendix R.

Requirements that account for all of the parameters that are important to fire protection and consistent with safety requirements for all plant-unique configurations have not been developed. In light of the experience gained in fire protection evaluations over the past four years, the Commission believes that the licensees should reexamine those previously approved configurations of fire protection that do not meet the requirements as specified in Section III.G to Appendix R. Based on this reexamination the licensee must either meet the requirements of Section III.G of Appendix R or apply for an exemption that justifies alternatives by a fire hazard analysis. However, based on present information, the Commission does not expect to be able to approve exemptions for fire-retardant coatings used as fire barriers.

The second relates to emergency lighting. Section III.J of Appendix R calls for 8-hour emergency lighting, whereas in some cases less than 8-hour emergency lighting has been accepted as satisfying Appendix A to BTP APCSB 9.5-1. While an adequate level of safety may be provided by less than an 8-hour supply, an 8-hour system would provide added protection and would generally involve only a small cost. The Commission therefore believes that licensees should upgrade the previously approved facilities to satisfy the 8-hour lighting requirement of Appendix R.

The third relates to protection against fires in noninerted containments involving reactor coolant pump lubrication oil (Section III.O of Appendix R). The proposed rule permitted either an oil collection system or a fire suppression system. The staff has also accepted an automatic fire suppression system as an acceptable method of fire protection for this application. The Commission has concluded that fire suppression systems do not give adequate protection for fires that may be induced by seismic events. The Commission therefore believes

that previously approved suppression systems should be replaced with oil collection systems that can withstand seismic events.

The technical basis on which these three sections are based are further discussed in Section III, "Specific Requirements," of this preamble.

3. Most commenters stated that the implementation schedule should be rewritten to allow an adequate time period for compliance. The proposed rule stated that "all fire protection and modifications identified by the staff as necessary to satisfy Criterion 3 of Appendix A to this part, whether contained in Appendix R to this part or in other staff fire protection guidance (except for alternate or dedicated shutdown capability) shall be completed by November 1, 1980 unless, for good cause shown, the Commission approves an extension," (proposed paragraph 50.48 1.(c)). The Commission went on to state its intention in the Statement of Consideration to the rule that " . . . no plant would be allowed to continue to operate after November 1, 1980, or beyond an extended date approved by the Commission, unless all modifications (except for alternate or dedicated shutdown capability) have been implemented."

The Commission has reconsidered the implementation schedule and has determined that it should be modified for the following reasons:

- After reviewing the comments and the information developed as a result of completion of fire reviews over the past 6 months, the staff has informed the Commission that the date of November 1, 1980, is not possible because the effective date of the rule will be after that date.
- The staff has informed the Commission that it would expect virtually all licensees to request exemptions if the new implementation dates do not provide an appropriate period of time for complying with the requirements of Appendix R. The time and manpower resources needed by the licensees to prepare such requests and by the staff to formulate recommendations on these requests is not warranted from the standpoint of timely fire protection improvement.

- The revised implementation schedule provides a careful balance of these considerations, calling for the remaining fire protection modifications to be implemented and installed on a phased schedule that is as prompt as can be reasonably achieved.

The revised schedules distinguish between requirements imposed for the first time on the licensee by Appendix R and and those requirements already imposed in license conditions or Technical Specifications issued prior to the effective date of the rule. For requirements imposed by Appendix R, including the items "backfit" to all plants, the schedule provides a reasonable time after publication of the rule for completion of required modifications. For requirements already imposed by license conditions providing for implementation after November 1, 1980, the Commission has reviewed these schedules and has found that in some instances the allotted time for completion of the required modifications may be excessive. Thus, for fire protection features other than those covered by Appendix R, although the Commission has extended the compliance dates beyond the November 1, 1980, date in the proposed rule, the Commission has added a requirement that limits the compliance schedule in existing licenses if such schedules extend beyond what we now believe should have been a reasonable schedule initially. Relief from such limitation may be granted by the Director of Nuclear Reactor Regulation upon a showing that there is good cause for extending such date and that public health and safety is not adversely affected by such extension.

It should also be noted that for licensees whose license conditions imposed a schedule with a compliance date of November 1, 1980, or other date prior to the effective date of § 50.48, the Commission has suspended such compliance dates by promulgating on October 29, 1980, a temporary rule § 50.48 (45 FR 71569), which will be superseded by this rule.

To better understand the nature of the public comments received and the staff's resolution of these comments, the following section will consider each section of Appendix R to this part. In Section III, we provide a summary of the Technical Basis for each requirement, followed by a summary of the

public comments and a statement of the staff's disposition of those comments.

Section I. **Introduction and Scope**

This section has been revised as a result of comments to include a discussion of the importance of safe shutdown capability and the distinction between requirements for "safety-related" equipment and equipment needed for "safe shutdown."

Section II. **General Requirements**

This section has been substantially rewritten as a result of comments to provide a concise summary of general requirements. The specific requirements were consolidated with the appropriate parts of Section III, "Specific Requirements," except that the credit given for 50-foot separation has been dropped.

Section III. **Specific Requirements**

The requirements in this rule are based upon principles long accepted within that portion of American industry that has been classified by their insurance carriers as "Improved Risk" or "Highly Protected Risk". In each of these cases, the Commission has decided that the overall interest of public safety is best served by establishing some conservative level of fire protection and ensuring that level of compliance exists at all plants. The following is a list of the specific technical bases and resolution of public comments for each of the specific requirements in Appendix R.

A. **Water Supplies for Fire Suppression Systems**

Technical Basis

One of the basic fire protection requirements for a modern industrial site in the United States is a separate water distribution system for fire protection with dual water supplies. Duplicate water supplies are required to ensure uninterrupted fire suppression capability allowing for single failures and periodic maintenance and repair of vital portions of the systems. Duplicate water supplies may consist of separate suctions for fire pumps from a large body of water such as lake, river, or pond or from two water storage tanks.

For nuclear power plants, the distribution system is required to consist of a loop around the plant with suitable valves for isolating portions of the system for maintenance or repair without interrupting the water supply to the various fire suppression systems in the plant. Thus, with dual supplies and a loop concept, an adequate water supply can be ensured to each manual or automatic water suppression system throughout the plant.

An ensured minimum volume of water is set aside and dedicated for fire protection uses to be available at all times regardless of other simultaneous water uses in the plant. This water volume is dedicated for fire service by means of separate storage tanks or separate pump suctions from a large body of water. When common tankage is employed for fire service needs and other water services, the fire pump suctions must be at the bottom of the tank and other water supply suctions must be located at a higher level to ensure that the minimum dedicated water volume is set aside for fire protection needs. Administrative controls by themselves, such as locked valves to ensure adequate water supply for fire fighting needs, are deemed unacceptable at nuclear power plants.

Comment Resolution

Many commenters stated that we were being too restrictive by stipulating an underground yard fire main loop and fresh water supplies. Our intent was only that a yard fire main loop be furnished. We have deleted the specification for an underground loop since special conditions may dictate that part of the loop be above ground or inside safety-related buildings. Such arrangements are acceptable.

With regard to the specification for a fresh water supply, the staff was attempting to avoid potential plant problems that are not associated with fire protection. From a fire protection standpoint, salt or brackish water is acceptable for fire suppression provided the fire protection system is designed and maintained for salt or brackish water. The requirement for fresh water supplies is therefore dropped. Other operational problems unrelated to fire protection that may result from the use of salt or brackish water for fire suppression activities are outside the scope of this regulation.

Several commenters took issue with the requirement for two separate redundant suctions, stating that some plants use a single large intake structure on a lake or a river for all water requirements. The requirement for separate intake structures was not intended and the rule has been clarified.

Several comments called for deleting the requirements for dedicated tanks or use of vertical standpipe for other water services when storage tanks are used for combined service-water/fire-water uses, on the basis that this is overly restrictive and other ways are available to ensure a dedicated supply such as weirs, suction location, etc. Two separate but related issues are involved here. The first is the requirement for dedicated water storage tanks for fire fighting purposes. The suggestion that the requirement for dedicated tanks be deleted was rejected for the reasons stated in the preceding Technical Basis.

The other point deals with ensuring minimum water storage capacity for fire suppression activities when storage tanks are used for combined service-water/fire-water uses. The term "vertical standpipe for other water service" simply means that the suction for other water uses in common storage tanks will be located sufficiently high to ensure the minimum water volume needs for fire suppression activities. If the commenters were assuming that "vertical standpipe" referred only to pipes inside the tank, this is not the case. In fact a standpipe exterior to the storage tank is more desirable since any leakage would be immediately evident. On an internal standpipe a leak in the pipe could actually allow depletion of the water otherwise to be reserved for fire uses. The rule has been clarified to allow physical alternatives for water supply dedication but to preclude exclusive use of administrative controls for this purpose.

Some commenters objected to the requirement that other water systems used as a backup water supply for fire protection should be permanently connected to the fire main system and suggested that it would be sufficient to provide a water supply capable of being connected to the fire main system within ten minutes of the loss of normal water supply or pumps. The rule does not address backup water supplies. The requirement means that, if another water system is used as one of the redundant

water supplies, it must satisfy all of the requirements of the fire protection water supplies. Additional backup supplies need not meet these requirements.

One commenter asked why only a two-hour water supply is required when the Browns Ferry Fire lasted well over two hours. All of the investigations of the Browns Ferry Fire clearly show that if water had been used immediately, the fire would have been extinguished much earlier. Indeed once the manual fire fighting activities were started with the use of only one fire hose stream, the fire was extinguished within one-half hour. The staff would find unacceptable any condition in which a postulated fire that could threaten safe shutdown capability could not be controlled and extinguished within two hours with any combination of manual and automatic fire suppression activities. Therefore, a two-hour water supply is considered adequate. It should also be noted that this minimum dedicated water volume is based on maximum flow rates. Since most fires are controlled and extinguished with much smaller flow rates, this requirement realistically represents a dedicated water volume far in excess of two hours.

B. Sectional Isolation Valves, and

C. Hydrant Isolation Valves

Technical Basis

These two requirements are similar and can be treated together. Proper valving is required to isolate portions of the water distribution system for maintenance or repair without interrupting the water supply to manual or automatic fire suppression systems inside the plant. Valves are similarly required to permit isolation of outside yard hydrants from the water distribution system for maintenance or repair without interrupting water supply to fire suppression systems inside the plant. Visually indicating valves such as post indicator valves are preferred so that the position of the valve can be readily determined. However, key-operated valves (commonly known as curb valves) are acceptable for these purposes where plant-specific conditions warrant their use.

C. **Hydrant Block Valves – Comment Resolution**

A number of commenters made suggestions for rewording this section. This section has been clarified to state the requirement for capability to isolate hydrants from the fire main without disrupting the water supply to automatic or manual fire suppression systems in any area containing or presenting a fire hazard to safety-related or safe shutdown equipment.

One commenter suggested that this requirement be dropped in its entirety since it "is a new requirement which has not been subjected to the peer review process." This suggestion was rejected on the basis that Appendix A to BTP APCSB 9.5-1 contains the following sentence: "The lateral to each hydrant from the yard main should be controlled by a visually indicating or key-operated (curb) valve," and there was an opportunity to comment on this document.

D. **Manual Fire Suppression**

Technical Basis

Considerable reliance is placed on automatic fire suppression systems throughout a nuclear power plant. However, manual fire fighting activities often can control and extinguish slowly developing fires before an automatic fire suppression system is actuated. In addition, fires that are controlled or extinguished by automatic systems require a certain amount of manual response. Also, some areas of the plant do not warrant the installation of automatic fire suppression systems. Manual response is the only fire suppression available for these areas; thus, it is important that manual fire fighting capability be present in all areas of the plant, and that standpipe and hose stations be located throughout the plant. The standpipe and hose stations are to be located so that at least one effective hose stream can be brought to bear at any location in the plant containing or presenting a hazard to structures, systems, or components important to safety. They are to be supplied from the fire water supply system except for those inside containment, which may be connected to other reliable water supplies if a separate penetration into containment cannot be made for fire water service needs.

Comment Resolution

Several commenters suggested adding a sentence reading "Standpipe and hose stations are not required if sufficient justification can be provided that adequate fire protection features have been provided to account for a given fire area." This suggestion was rejected. The staff has taken the position that the minimum requirements are that at least one effective hose stream that will be able to reach any location that contains or could present an exposure fire hazard to the safety-related equipment. The Commission concluded that no analyses can identify hazards so carefully that this minimum requirement can be further reduced.

E. **Hydrostatic Hose Test**

Technical Basis

Fire hoses should be hydrostatically tested periodically to ensure that they will not rupture during use. The requirement for a minimum test pressure of 300 psi comes from NFPA #196 (National Fire Protection Association Standard #196 - Standard for Fire Hose), a nationally recognized consensus standard. This standard contains other guidance for the use and care of fire hose that most industries find useful.

Comment Resolution

Many commenters pointed out the erroneous usage of the term "service pressure" rather than "operating pressure" in this requirement. The intended meaning for this requirement is that all hoses would be tested at a pressure greater than the maximum pressure found in the fire protection water distribution systems. The correct terminology is "operating pressure." The rule has been so changed. In addition, the staff added a specific minimum test pressure requirement of 300 psi to meet the NFPA standard.

One commenter also pointed out that hoses should be inspected for mildew, rot, cuts, or other damage. Although this is a valid comment, it is not an unresolved issue with any licensee so it need not be covered by this rule. In addition, such inspections are already being performed in accordance with the plant's Technical Specifications.

F. **Automatic Fire Detection**

Technical Basis

The requirement that automatic fire detection systems be installed in all areas that contain safe shutdown or safety-related systems or components follows generally accepted fire protection practice. Installation of such fire detection capability is independent of any requirements for automatic or manual fire suppression capability in an area. The purpose of these detection systems is to give early warning of fire conditions in an area so that the fire brigade can initiate prompt actions to minimize fire damage within the plant.

Comment Resolution

Many commenters suggested that the words "automatic fire detection capability" be substituted for "automatic fire detection systems" on the basis that, as worded, the requirements are too limiting. They stated that an automatic sprinkler system with appropriate alarm check valves and central alarm features provides acceptable detection/alarming capability. Several commenters claimed that a separate detection system is not needed in areas covered by sprinkler systems equipped with fusible link sprinkler heads. A fusible link has a time delay before it actuates. However, more importantly, a smoldering localized fire that could do damage may not generate enough heat to melt the fusible link. While we do not disagree that the alarm from an automatic fire suppression system serves as notification that a fire exists, we concluded that the minimum requirement for a separate fire detection system in all such areas should be retained. The fire hazards analysis may call for a separate suppression system, but this would be in addition to the fire detection system.

G. **Protection of Safe Shutdown Capability**

Technical Basis

The objective for the protection of safe shutdown capability is to ensure that at least one means of achieving and maintaining safe shutdown conditions will remain available during and after any postulated fire in the plant. Because it is not possible to predict the specific conditions under which fires

may occur and propagate, the design basis protective features are specified rather than the design basis fire. Three different means for protecting the safe shutdown capability outside of containment are acceptable. The first means is separation of redundant safe shutdown trains and associated circuits by means of 3-hour fire rated barriers. The second means is a combination of separation of redundant safe shutdown trains and associated circuits by a 1-hour fire rated barrier and automatic fire suppression and detection capability for both redundant trains. The third means, which may be used only when redundant trains and associated circuits are separated by 20 feet or more of clear space, requires automatic fire suppression and detection systems in the area. An alternative or dedicated safe shutdown capability independent of the fire area is required if fire protection for safe shutdown capability cannot be provided as outlined above. For cables and equipment needed for safe shutdown located inside of noninerted containments, a lesser degree of fire protection is permitted because transient exposure fires are less likely inside containment during plant operation. Section III.M, "Fire Barriers," discusses the technical basis for the 3-hour barrier, and Section III.L, "Alternative and Dedicated Shutdown Capability," discusses the technical basis for safe shutdown capability.

Comment Resolution

Many commenters suggested that the first paragraph be changed slightly and the rest of this section deleted. The basis for their contention is that the rule should state simply the requirement to protect cables or equipment of systems necessary for safe shutdown of the plant and leave specific implementation details in some other type of document.

We have modified this section by removing the listing of considerations, deleting Table 1, and revising the wording to provide clarification.

H. Fire Brigade, and

I. Fire Brigade Training

Technical Basis

Most modern industrial plants with replacement cost values approaching those of a modern nuclear powered electric

generating station have a full-time fully equipped fire department, including motorized fire apparatus. Because of the reduced severity of fire hazards in a nuclear generating station as compared to a manufacturing plant, the Commission believes that it is not necessary to mandate a fully staffed fire department. However, manual fire response capability is required at a nuclear plant and a properly equipped and fully trained fire brigade will satisfy this need. The Commission has determined that a brigade of five persons constitutes the minimum size sufficient to perform the actions that may be required by the brigade during the fire and to provide some margin for unanticipated events.[1] Similarly, the training requirements listed are considered the minimum needed to ensure that the fire brigade will be able to function effectively during a fire emergency.

The proposed rule required emergency breathing apparatus without specifying the number of such pieces of apparatus. The rule has been modified to specify the personnel for whom such apparatus is to be provided and to specify reserve air requirements.

H. Fire Brigade – Comment Resolution

Many commenters suggested changing this requirement to a simple statement that a trained and equipped, nominal size, site fire brigade of five persons be provided on each shift unless a lesser number is justified. This recommended change was rejected by the Commission for the reasons stated in the Technical Basis.

Some commenters objected to the exclusion of the shift supervisor from the fire brigade. The commenters felt that the shift supervisor should go to the fire and provide the benefit of his expertise and authority. The rule would not prevent this. However, the shift supervisor may have to go elsewhere during the course of a fire that adversly affects plant operation. The fire brigade leader must stay with the fire brigade and be assigned

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[1] This is discussed at length in the NRC staff's "Evaluation of Minimum Fire Brigade Shift Size", dated June 8, 1979; copies are available from David P. Notley, Office of Standards Development, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555.

no other responsibilities during a fire emergency, therefore, the shift supervisor must be excluded from membership on the fire brigade.

I. **Fire Brigade Training – Comment Resolution**

Many commenters have stated that NRC used unnecessary detail in spelling out specific requirements for classroom instruction, fire fighting practice, and fire drills. Some commenters felt that these requirements were more detailed than anything the Commission has published with regard to operator training. The Commission here points out that most of the investigations of the TMI accident identified inadequately trained operators as an important factor and that work is now being done in this area. The fact is not that the training requirements spelled out here for the fire brigade members are excessive when compared to training requirements for reactor operators, but that fire brigade training is further along in development, and training parameters that are essential to a comprehensive program have been identified.

J. **Emergency Lighting**

Technical Basis

Emergency lighting is required in all nuclear power plants. Battery-powered lights with capacities of 1-1/2 to 2 hours is usually sufficient for emergency egress. However, the postfire emergency lighting requirements in a nuclear power plant are of a different kind. The need is for lighting that aids the access to equipment and components that must be manually operated by plant personnel to effect safe plant shutdown during plant emergencies. Because such activities may extend over a considerable period of time both during and after the fire, it is prudent to provide 8-hour battery emergency lighting capability to allow sufficient time for normal lighting to be restored with a margin for unanticipated events.

Comment Resolution

Many commenters stated that the requirement for emergency lighting is overly restrictive in three specifics: first, that emergency lighting is unnecessary in many of the designated areas; second, that the requirement for sealed beam or

fluorescent units is overly restrictive; third, that the requirement for individual 8-hour battery power supply is excessive. Three commenters recommended a 2-hour battery power supply; five commenters recommended a plant-specific power supply; and the one commenter recommended that there be no permanent installation.

These suggestions have been accepted in part. Lighting units with 8-hour battery supplies are to be provided in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto. The reasoning behind the requirement for an 8-hour battery power supply is that there can be a great deal of other activity during a fire emergency and operators involved in safe plant shutdown should not also have to be concerned with lighting in the area. The small cost differential between 2-hour supply and the substantial additional protection afforded by the 8-hour supply does not warrant reducing this requirement. The Commission has decided to require an 8-hour battery power supply in all areas needed for operation of safe shutdown equipment and in access and egress routes.

K. Administrative Controls

Technical Basis

The fire protection program uses administrative controls for fire prevention and prefire planning. The items listed in this section are generally accepted within the fire protection community as minimum requirements for an effective administration of the fire protection program. Controls are placed on the storage and use of combustible materials to reduce the fire loading in safety-related areas and on ignition sources to avoid careless operations. Procedures are used to control actions to be taken by individuals who discover a fire and by the fire brigade for the development of preplanned fire fighting strategies and actual fire fighting techniques.

Comment Resolution

Many commenters stated that this requirement was much too detailed for a regulation. Some stated that the requirements should apply only to those areas having safe shutdown equipment. Other commenters stated that a simple

statement that administrative procedures should be established to control the various fire hazards throughout the plant was sufficient, and that the details could be spelled out in a regulatory guide or some other similar document.

Minor changes have been made in the wording of this requirement for clarification.

L. Alternative and Dedicated Shutdown Capability

Technical Basis

In some locations (such as the cable spreading room) within operating nuclear power plants, it is not always possible or practicable to protect redundant safe shutdown systems against adverse effects of fire or fire suppression activities only through the use of fire protection features because the redundant safe shutdown systems in a given fire area are too close to each other. Alternative shutdown capability has usually been required to be independent of the control room, cable spreading room, switchgear rooms and cable riser areas because redundant systems in these areas are not adequately separated. When plant modifications to provide alternative shutdown systems are extensive, a dedicated system that is essentially a minimum capability safe shutdown train and is independent of those already existing may be provided. This minimum capability is required to maintain the process variables within those values predicted for a loss of offsite power. The case of loss of offsite power is assumed because fires in certain circumstances (e.g., electrical distribution systems) could cause or be related to such a loss. Fire damage to cold shutdown capability is limited to damage that can be repaired within 72 hours to provide a margin in achieving cold shutdown conditions. Consideration is given to associated circuits because most plants were not designed with this concept in mind. Should either the alternative or dedicated capability be required to function because of a fire, it must not be disabled by fire damage to associated circuits. Also, this capability does not have to meet the single failure criterion because it is only one of several levels of defense. Seismic Category I criteria is not imposed because fires that would require the installation of alternative or dedicated shutdown capability are not seismically induced.

Comment Resolution

Many of the commenters stated that this requirement exceeded the scope of Appendix R by defining alternative shutdown requirements. They stated that the time requirements are excessive and should be dropped. They also contend that this regulation does not take into account the many plant reviews being conducted under the Systematic Evaluation Program (SEP).

It is generally understood that cold shutdown is the ultimate safe shutdown condition and that, for each fire area, different means may be used and may be necessary to achieve cold shutdown. Because a fire in certain areas at some plants would have the capability of disabling systems required to achieve both hot and cold shutdown, it is necessary to specify the minimum capability and time requirement for each condition necessary to achieve safe shutdown. We agree that evaluations being made under the Systematic Evaluation Program (SEP) may also call for alternative or dedicated shutdown capability for reasons other than fire protection. For example, seismic, flooding, or emergency core cooling requirements resulting from the SEP may require additional modifications. Each licensee should be aware of the status of the SEP so that the requirements resulting from SEP can be effectively integrated with those relating to fire protection to the extent possible. However, the Commission has decided that the modifications required to complete the fire protection program should not be deferred until the SEP review is completed.

M. Fire Barriers

Technical Basis

The best fire protection for redundant trains of safe shutdown systems is separation by unpierced fire barriers – walls and ceiling-floor assemblies. Because these barriers are passive fire protection features, they are inherently reliable provided they are properly installed and maintained. Fire barriers have been used successfully for many years to subdivide large potential fire losses into smaller, more acceptable risks. Even fire barriers with openings have successfully interrupted the

progress of many fires provided the openings were properly protected by fire doors or other acceptable means.

Fire barriers are "rated" for fire resistance by being exposed to a "standard test fire". This standard test fire is defined by the American Society for Testing and Materials in ASTM E-119, "Standard for Fire Resistance of Building Materials." Fire barriers are commonly rated as having a fire resistance of from 1 to 8 hours. Most "Improved Risk" or "Highly Protected Risk" (as classified by insurance carriers) industrial properties in the United States require fire barriers to have a resistance rating of 2 to 4 hours.

While a nuclear power plant has a low fire load, the potential consequences of fire are serious. Therefore, the Commission has selected 3 hours as an acceptable minimum fire resistance rating for fire barriers separating redundant trains for safe shutdown systems. This will give ample time for automatic and manual fire suppression activities to control any potential fire and for safe shutdown activities to properly control the reactor. Many operating plants, or plants that are already built but that are not yet operating, have both trains of safe shutdown equipment located in close proximity and a single fire could damage or destroy the functional capability of both redundant trains. If specific plant conditions preclude the installation of a 3-hour fire barrier to separate the redundant trains, a 1-hour fire barrier and automatic fire suppression system for each redundant train will be considered the equivalent of 3-hour barrier.

If the 1-hour fire barrier and automatic fire suppression for each redundant train cannot be provided because of plant-specific conditions, alternative or dedicated shutdown capability will be required to ensure safe shutdown capability. The use of a 1-hour barrier in conjunction with automatic fire suppression and detection capability for each redundant train of safe shutdown equipment is based on the following considerations. Automatic suppression is required to ensure prompt, effective application of suppressant to a fire that could endanger safe shutdown capability. The activation of an automatic fire detection or suppression system does not occur until sufficient smoke or heat has been developed by the fire. Therefore,

the Commission is requiring a 1-hour barrier to ensure that fire damage will be limited to one train until the fire is extinguished.

These requirements have now been incorporated in Section III.G, "Fire Protection of Safety Functions."

Comment Resolution

Several commenters made a number of suggestions of an editorial nature. One suggestion was to add "or unless other fire protection features have been provided to ensure equivalent protection" in the first paragraph, where three-hour rated fire barriers were stipulated unless a lower rating was justified by the fire hazards analysis. The Commission feels that this adds nothing in the way of clarification and the suggestion was not adopted. The second paragraph requires that structural steel forming a part of or supporting any fire barrier have a fire resistance equivalent to that required of the barrier. An example was given of metal lath and plaster covering as being one means of providing equivalent protection. Several commenters stated that they thought this was too narrow and would be interpreted by some people as the only acceptable method permitted. Since the example seemed to be confusing, a decision has been made to eliminate it. Other comments to the effect that the requirement was excessively restrictive with regard to fire barrier penetrations, including fire doors and their associated frames and hardware, and ventilation systems have been acted upon by the staff and the requirement, as it had affected these items, was deleted.

N. Fire Barrier Cable Penetration Seal Qualifications

Technical Basis

Unpierced fire barriers offer the best protection for separating redundant trains of safety-related or safe shutdown equipment. However, these barriers must be pierced for both control and power cables. These penetrations must be sealed to achieve a degree of fire resistance equivalent to that required of the barrier that is pierced. ASTM Standard E-119 is the national consensus standard used for testing and rating these cable penetration seals. Since the cables conduct the heat through the barrier, and since the cable insulation is combustible, the acceptance

criteria of the ASTM Standard E-119 relating to temperature on the unexposed side must be appropriately modified.

Comment Resolution

Some commenters suggested that this entire section be deleted and replaced with the following two sentences: "Penetration seals shall provide the equivalent protection which is required of the fire barrier. Evaluation of the penetration seals based upon a design review and relevent test data or qualification tests may be made." The commenters felt that sufficient test data are available to permit evaluation of design requirements without full-scale mockup testing and that many of the items spelled out in the regulation, such as the water hose stream test, were too detailed and did not belong in the regulation. The Commission has reconsidered this issue and revised the rule to (a) require the use of noncombustible materials only in the construction of fire barrier penetration seals, (b) require fire barrier penetration seals to be qualified by test; and (c) require such tests to satisfy certain acceptance criteria.

O. **Fire Doors**

Technical Basis

Door openings in fire walls constitute another breach that must be protected. Fire doors that have been tested and rated for certain fire exposures are installed to protect these openings. Fire doors frequently fail to protect the openings in which they are installed because they are not fully closed. Various methods are available to licensees to ensure that fire doors are in proper operating condition and that they will be closed during a fire. These options are listed in Appendix R.

Comment Resolution

Many commenters stated that this requirement is too detailed and should be deleted. Minor editorial changes have been made in order to more clearly state the requirements.

P. **Reactor Coolant Pump Lubrication System**

Technical Basis

Each reactor coolant pump motor assembly typically contains 140 to 220 gallons of lube oil. Oil leaking from some portions of the lube oil system may come in contact with surfaces that are hot enough to ignite the oil. The resulting fire could be large, and access to the fire would be delayed because of the time required to enter the containment. Containment air temperature would increase, severe localized environments would develop in the area of the fire, and a large amount of smoke would be generated. These conditions could affect operability of safety-related equipment inside containment. Therefore, an oil collection system is necessary to confine any oil discharged due to leakage or failure of the lubrication system and to prevent it from becoming a fire hazard by draining it to a safe location. These occurrences could be random or could be seismically induced because the existing lube oil system piping and oil collection systems may not be designed to withstand a design basis seismic event.

Appendix A to BTP APCSB 9.5-1 states that for operating plants, "postulated fires or fire protection system failures need not be considered concurrent with other plant accidents or the most severe natural phenomena." The basis for that statement is two fold. First, nuclear power plants are massive structures, and essential services are designed to withstand earthquakes and other natural phenomena. Second, the history of many fires associated with recent earthquakes have been evaluated. These evaluations showed that such fires usually are due to failure of piping or tanks of flammable gasses or liquids such as municipal natural gas distribution systems or gasoline storage and/or dispensing stations. Where such potential fire hazards exist in nuclear power plants (e.g., hydrogen for generator cooling, or oil fuel for the emergency diesel generator or station space heating boilers) they are designed and installed to withstand the damaging effects of various natural phenomena, and other special fire protection features are provided as necessary. However, General Design Criterion 2 *Design Bases for Protection Against Natural Phenomena* requires that structures, systems, and components important to safety be designed to withstand the effects of

earthquakes without loss of capability to perform their safety function. Regulatory Guide 1.29, "Seismic Design Classification," describes an acceptable method for identifying and classifying those features of light-water-cooled nuclear power plants that should be designed to withstand the effects of the Safe Shutdown Earthquake. In this guide, paragraph C.1 applies to systems that are required to remain functional to ensure heat removal capability; paragraph C.2 applies to systems that do not have to remain functional for that purpose, but whose failure could reduce the functioning of those systems covered by paragraph C.1. The reactor coolant pump oil collection system is covered by paragraph C.2 because its function is required to protect safety-related systems rather than to perform a safety function. Because the failure of the oil collection system for a seismically induced oil fire should not prevent a safety-related system from performing its safety function (Regulatory Guide 1.29, "Seismic Design Classification," paragraph C.2), the oil collection system should be designed, engineered, and installed so that its failure will not lead to a fire affecting safety-related equipment as a result of an earthquake.

The proposed rule permitted two alternatives – an oil collection system or an automatic fire suppression system. We have deleted the alternative of the suppression system because unacceptable damage may result to the safety-related systems from the burning of oil before the suppression system is actuated and because the fire water supply system is not designed to withstand seismic events. In addition, these pumps are located within the biological shield inside containment, therefore, timely fire brigade action would be difficult if the suppression system malfunctions. Further, if the suppression system becomes inoperable during operation, a fire watch or patrol cannot enter the area during operation.

Comment Resolution

A number of commenters suggested that this section is too detailed and should be substantially modified. This requirement was changed to delete the option of portecting the reactor coolant pump lubrication system with an automatic fire suppression system. We have modified the rule to indicate that the requirement that the oil collection system be designed

to provide reasonable assurance that it will withstand the Safe Shutdown Earthquake can be met by satisfying paragraph C.2. of Regulatory Guide 1.29, "Seismic Design Classification," as described above.

Q. Associated Circuits

Technical Basis

When considering the consequences of a fire in a given fire area during the evaluation of safe shutdown capabilities of a plant, the staff must be able to conclude that one train of equipment that can be used immediately to bring the reactor to a hot shutdown condition remains unaffected by that fire. The staff must also be able to conclude that damage to one train of equipment used for achieving cold shutdown will be limited so that the equipment can be returned to an operable condition within 72 hours. (See Technical Basis for Section III.G, "Protection of Safe Shutdown Capability.") In the fire hazards analysis for a plant, the equipment relied upon to perform both functions must be identified for each fire area. It follows that any associated non-safety circuits in the fire area that could adversely affect the identified shutdown equipment by feeding back potentially disabling conditions (e.g., hot shorts or shorts to ground) to the power supplies or control circuits of that equipment must also be evaluated. Of course such disabling conditions must be prevented to provide assurance that the identified safe shutdown equipment will function as designed. These requirements have now been incorporated in Section III.L, "Alternative and Dedicated Shutdown Capability."

Comment Resolution

Many commenters stated that this requirement should be deleted because many older plant designs did not consider associated circuits and this is, therefore, a new design requirement. The commenters felt that the analysis that will be required to satisfy this requirement will be both long and complicated and the requirement should therefore be deleted.

The Commission rejected these suggestions for the following reasons.

1. Virtually all of the fire protection modifications made to date have been required to correct deficiencies that resulted from lack of consideration of certain specific items during initial design and construction.

2. The Browns Ferry fire showed the necessity of divisional separation of the associated circuit of the control cables to prevent the disabling of safety systems by a single fire. This has been discussed with licensees during evaluations of alternative and dedicated shutdown capability and is necessary to ensure that safe shutdown systems will be able to function properly in the event of fire.

3. The staff considers incomplete any fire hazard analysis that does not consider the effects of fire damage to circuits that are associated with safe shutdown systems.

As indicated above, as a result of the comments received on this issue, it is unclear that associated circuits have in fact been adequately considered by licensees in their reviews using the guidance of Appendix A to BTP APCSB 9.5-1. To ensure that the associated circuits are considered, all operating nuclear power plants will be required to meet the requirements of Section III.G of Appendix R.

General Comments Resolution:

Several commenters contended that Commission regulations mandate that an adjudicatory hearing be conducted prior to a final decision. One commenter labeled the regulation an "order" within the meaning of the Administrative Procedure Act (5 U.S.C. § 551(6)) (APA) and asserted that 10 CFR § 2.204 of the Commission's regulations, "Order for Modification of License," applies to this rulemaking proceeding.

The Commission disagrees with these comments. A "rule" is defined in the APA to mean "the whole or a part of an agency statement of general or particular applicability and future effect designed to implement . . . or prescribe law or policy . . ." (5 U.S.C. § 551(4)). The agency action questioned here is clearly one that treats similarly situated licensees equally and that prescribes future conduct or requirements. For those licensees who have not already provided an equivalent level of

fire protection, certain specific fire protection features are required. Various of these requirements would apply to approximately 40 facilities. The commenter's characterization of the rule as an order, along with the assertion that 10 CFR § 2.204 mandates a hearing before the rule becomes final is incorrect. On its face, that regulation (which does grant a hearing right) applies only to Commission orders that modify a license.[2] It does not apply to requirements promulgated through a rulemaking action conducted in accordance with the requirements of applicable law.

Several commenters contended that the environmental impact had not been adequately addressed. One commenter, citing the requirements in Section III.A of Appendix R for two water supplies and two separate redundant sections as examples of requirements involving environmental issues, contended that the Commission relied upon its staff's "unsupported determination that, pursuant to 10 CFR § 51.5(d), an environmental impact statement, appraisal, or negative declaration is not required." The Commission has considered Section III.A and has further considered the remaining requirements of Appendix R and remains convinced that the regulations are not substantive and are insignificant from the standpoint of environmental impact.

One commenter suggested that all plants be required to install dedicated shutdown capability. The Commission does not agree. We believe that the Commission's overall fire protection program involving extensive plant-specific fire protection modifications that are based on guidance set forth in Branch Technical Position BTP APCSB 9.5-1 and its Appendix A and the specific requirements of Appendix R to resolve disputed issues provide adequate fire protection.

One commenter stated that the ambiguity of the proposed regulation with regard to critical items requires that it be renoticed. The commenter referenced three portions of the proposed Appendix R as examples of such ambiguity. They were

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[2] It should also be noted that Section 2.204 is codified in Subpart B of 10 CFR Part 2. The scope of Subpart B is specifically limited to "cases initiated by the staff . . . to impose requirements by *order* on a licensee" (10 CFR § 2.200(a)). [Emphasis supplied.]

Section III.G, Section III.N, and Section III.Q. We have reviewed these examples.

In reference to the first example, the commenter stated that the first paragraph of Section III.G identifies alternative shutdown capability as an optional protective feature and that paragraph III.G.2.c then identifies alternative shutdown capability as a minimum fire protection feature. We do not agree with this statement. The first paragraph of Section III.G identifies alternative shutdown capability as one option in a combination of fire protection features for a specific fire area. Paragraph III.G.3 indicates when this option should be used.

In reference to the second example, the commenter stated that Section III.N requires a pressure differential across the test specimen during the testing of fire barrier penetration seals but fails to define the pressure differential. This comment is incorrect. The pressure differential called for by the proposed provision was the maximum pressure differential that the barrier would experience in the specific plant installation. In any event, the requirement for pressure differential during such testing has been deleted since only noncombustible material is now being used for such seals.

In reference to the third example, the commenter stated that Section III.Q is totally lacking in definition. We do not agree. Footnote 6 references Regulatory Guide 1.75 and IEEE Std 384-1974. The latter document is a commonly used industry standard that defines associated circuits and provides guidance for ensuring that such circuits do not compromise the independence of the shutdown circuits they are associated with.

Based on the above examples and our review of the other provisions of the proposed rule, we do not believe that the rule as proposed was ambiguous so as to require renoticing. Moreover, it should be noted that, based on other comments received on the proposed regulations, other commenters demonstrated a thorough understanding of the proposed requirements.

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, as amended, and Sections 552 and 553 of Title 5 of the United States Code, notice

is hereby given that the following amendments to Title 10, Chapter I, Code of Federal Regulations, Part 50, are published as a document subject to codification.

1. A new § 50.48 is added to read as follows:

§ 50.48 Fire Protection.

(a) Each operating nuclear power plant shall have a fire protection plan that satisfies Criterion 3 of Appendix A to this part. This fire protection plan shall describe the overall fire program for the facility, identify the various positions within the licensee's organization that are responsible for the program, state the authorities that are delegated to each of these positions to implement those responsibilities, and outline the plans for fire protection, fire detection and suppression capability, and limitation of fire damage. The plan shall also describe specific features necessary to implement the program described above, such as administrative controls and personnel requirements for fire prevention and manual fire suppression systems, and the means to limit fire damage to structures, systems, or components important to safety so that the capability to safely shut down the plant is ensured.[3]

(b) Appendix R to this part establishes fire protection features required to satisfy Criterion 3 of Appendix A to this part with respect to certain generic issues for nuclear power plants licensed to operate prior to January 1, 1979. Except for the requirements of Sections III.G, III.J, and III.O, the provisions of Appendix R to this part shall not be applicable to

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[3] Basic fire protection guidance for nuclear power plants is contained in two NRC documents:

- Branch Technical Position Auxiliary Power Conversion System Branch BTP APCSB 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants," for new plants docketed after July 1, 1976, dated May 1976.
- Appendix A to BTP APCSB 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976," for plants that were operating or under various stages of design or construction before July 1, 1976, dated August 23, 1976.

Also see Note 4.

nuclear power plants licensed to operate prior to January 1, 1979 to the extent that fire protection features proposed or implemented by the licensee have been accepted by the NRC staff as satisfying the provisions of Appendix A to Branch Technical Position BTP APCSB 9.5-1[4] reflected in staff fire protection safety evaluation reports issued prior to the effective date of this rule, or to the extent that fire protection features were accepted by the staff in comprehensive fire protection safety evaluation reports issued before Appendix A to Branch Technical Position BTP APCSB 9.5-1 was published in August 1976. With respect to all other fire protection features covered by Appendix R, all nuclear power plants licensed to operate prior to January 1, 1979 shall satisfy the applicable requirements of Appendix R to this part, including specifically the requirements of Sections III.G, III.J, and III.O.

(c) All fire protection modifications require to satisfy the provisions of Appendix R to this part or directly affected by such requirements shall be completed on the following schedule:

(1) Those fire protection features that involve revisions of administrative controls, manpower changes, and training, shall be implemented within 30 days after the effective date of this section and Appendix R to this part.

(2) Those fire protection features that involve installation of modifications that do not require prior NRC approval or

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[4] Clarification and guidance with respect to permissible alternatives to satisfy Appendix A to BTP APCSB 9.5-1 has been provided in four other NRC documents.

- "Supplementary Guidance on Information Needed for Fire Protection Evaluation," dated October 21, 1976.
- "Sample Technical Specification," dated May 12, 1977.
- "Nuclear Plant Fire Protection Functional Responsibilities, Administrative Control and Quality Assurance," dated June 14, 1977.
- Manpower Requirements for Operating Reactors," dated May 11, 1978.

A Fire Protection Safety Evaluation Report that has been issued for each operating plant states how these guidelines were applied to each facility and identifies open fire protection issues that will be resolved when the facility satisfies the appropriate requirements of Appendix R to this part.

plant shutdown shall be implemented within 9 months after the effective date of this section and Appendix R to this part.

(3) Those fire protection features, except for those requiring prior NRC approval by paragraph (c)(5) of this section, that involve installation of modifications that do require plant shutdown, the need for which is justified in the plans and schedules required by the provisions of paragraph (c)(5) of this section, shall be implemented before startup after the earliest of the following events commencing 180 days or more after the effective date of this section and Appendix R to this part:

(i) the first refueling outage;

(ii) another planned outage that lasts for at least 60 days; or

(iii) an unplanned outage that lasts for at least 120 days.

(4) Those fire protection features that require prior NRC approval by paragraph (c)(5) of this section, shall be implemented within the following schedule: dedicated shutdown systems – 30 months after NRC approval; modifications requiring plant shutdown – before startup after the earliest of the events given in paragraph (c)(3) commencing 180 days after NRC approval; modifications not requiring plant shutdown – 6 months after NRC approval.

(5) Licensees shall make any modifications necessary to comply with these requirements in accordance with the above schedule without prior review and approval by NRC except for modifications required by Section III.G.3 of Appendix R to this part. Licensees shall submit plans and schedules for meeting the provisions of paragraphs (c)(2), (c)(3), and (c)(4) within 30 days after the effective date of this section and Appendix R to this part. Licensees shall submit design descriptions of modifications needed to satisfy Section III.G.3 of Appendix R to this part within 30 days after the effective date of this section and Appendix R to this part.

(6) In the event that a request for exemption from a requirement to comply with one or more of the provisions of Appendix R filed within 30 days of the effective date of this rule is based on an assertion by the licensee that such required

modifications would not enhance fire protection safety in the facility or that such modifications may be detrimental to overall facility safety, the schedule requirements of paragraph (c) shall be tolled until final Commission action on the exemption request upon a determination by the Director of Nuclear Reactor Regulation that the licensee has provided a sound technical basis for such assertion that warrants further staff review of the request.

(d) Fire protection features accepted by the NRC staff in Fire Protection Safety Evaluation Reports referred to in paragraph (b) of this section and supplements to such reports, other than features covered by paragraph (c), shall be completed as soon as practicable but no later than the completion date currently specified in license conditions or technical specifications for such facility, or the date determined by paragraphs (d)(1) through (d)(4) of this section, whichever is sooner, unless the Director of Nuclear Reactor Regulation determines, upon a showing by the licensee, that there is good cause for extending such date and that the public health and safety is not adversely affected by such extension. Extensions of such date shall not exceed the dates determined by subparagraphs (c)(1) through (c)(4) of this section.

(1) Those fire protection features that involve revisions of administrative controls, manpower changes, and training shall be implemented within 4 months after the date of the NRC staff Fire Protection Evaluation Report accepting or requiring such features.

(2) Those fire protection features involving installation of modifications not requiring prior approval or plant shutdown shall be implemented within 12 months after the date of the NRC staff Fire Protection Safety Evaluation Report accepting or requiring such features.

(3) Those fire protection features, including alternative shutdown capability, involving installation of modifications requiring plant shutdown shall be implemented before the startup after the earliest of the following events commencing 9 months or more after the date of the NRC staff Fire Protection Safety Evaluation Report accepting or requiring such features:

(i) the first refueling outage;

(ii) another planned outage that lasts for at least 60 days; or

(iii) an unplanned outage that lasts for at least 120 days.

(4) Those fire protection features involving dedicated shutdown capability requiring new buildings and systems shall be implemented within 30 months of NRC approval. Other modifications requiring NRC approval prior to installation shall be implemented within 6 months after NRC approval.

(e) Nuclear power plants licensed to operate after January 1, 1979, shall complete all fire protection modifications needed to satisfy Criterion 3 of Appendix A to this part in accordance with the provisions of their licenses.

2. A new Appendix R is added to 10 CFR Part 50 to read as follows:

APPENDIX R – FIRE PROTECTION PROGRAM FOR NUCLEAR POWER FACILITIES OPERATING PRIOR TO JANUARY 1, 1979

I. INTRODUCTION AND SCOPE

This Appendix applies to licensed nuclear power electric generating stations that were operating prior to January 1, 1979, except to the extent set forth in paragraph 50.48(b) of this part. With respect to certain generic issues for such facilities it sets forth fire protection features required to satisfy Criterion 3 of Appendix A to this part.[5]

Criterion 3 of Appendix A to this part specifies that "Structures, systems, and components important to safety shall be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions."

When considering the effects of fire, those systems associated with achieving and maintaining safe shutdown conditions assume major importance to safety because damage to them can lead to core damage resulting from loss of coolant through boiloff.

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[5] See footnote 4.

The phrases "important to safety," or "safety-related," will be used throughout this Appendix R as applying to all safety functions. The phrase "safe shutdown" will be used throughout this Appendix R as applying to both hot and cold shutdown functions.

Because fire may affect safe shutdown systems and because the loss of function of systems used to mitigate the consequences of design basis accidents under postfire conditions does not per se impact public safety, the need to limit fire damage to systems required to achieve and maintain safe shutdown conditions is greater than the need to limit fire damage to those systems required to mitigate the consequences of design basis accidents. Three levels of fire damage limits are established according to the safety function of the structure, system, or component.

Safety Function	Fire Damage Limits
Hot Shutdown	One train of equipment necessary to achieve hot shutdown from either the control station(s) must be maintained free of fire damage by a single fire, including an exposure fire.[6]
Cold Shutdown	Both trains of equipment necessary to achieve cold shutdown may be damaged by a single fire, including an exposure fire, but damage must be limited so that at least one train can be repaired or made operable within 72 hours using onsite capability.
Design Basis Accidents	Both trains of equipment necessary for mitigation of consequences following design basis accidents may be damaged by a single exposure fire.

[6] *Exposure Fire.* An exposure fire is a fire in a given area that involves either in situ or transient combustibles and is external to any structures, systems, or components located in or adjacent to that same area. The effects of such fire (e.g., smoke heat, or ignition) can adversely affect those structures, systems, or components important to safety. Thus, a fire involving one train of safe shutdown equipment may constitute an exposure fire for the redundant train located in the same area, and a fire involving combustibles other than either redundant train may constitute an exposure fire to both redundant trains located in the same area.

The most stringent fire damage limit shall apply for those systems that fall into more than one category. Redundant systems used to mitigate the consequences of other design basis accidents but not necessary for safe shutdown may be lost to a single exposure fire. However, protection shall be provided so that a fire within only one such system will not damage the redundant system.

II. GENERAL REQUIREMENTS

A. Fire Protection Program

A fire protection program shall be established at each nuclear power plant. The program shall establish the fire protection policy for the protection of structures, systems, and components important to safety at each plant and the procedures, equipment, and personnel required to implement the program at the plant site.

The fire protection program shall be under the direction of an individual who has been delegated authority commensurate with the responsibilities of the position and who has available staff personnel knowledgeable in both fire protection and nuclear safety.

The fire protection program shall extend the concept of defense-in-depth to fire protection in fire areas important to safety, with the following objectives:

- to prevent fires from starting;
- to detect rapidly, control, and extinguish promptly those fires that do occur;
- to provide protection for structures, systems, and components important to safety so that a fire that is not promptly extinguished by the fire suppression activities will not prevent the safe shutdown of the plant.

B. Fire Hazards Analysis

A fire hazards analysis shall be performed by qualified fire protection and reactor systems engineers to (1) consider potential in situ and transient fire hazards; (2) determine the consequences of fire in any location in the plant on the

ability to safely shut down the reactor or on the ability to minimize and control the release of radio-activity to the environment; and (3) specify measures for fire prevention, fire detection, fire suppression, and fire containment and alternative shutdown capability as required for each fire area containing structures, systems, and components important to safety in accordance with NRC guidelines and regulations.

C. **Fire Prevention Features**

Fire protection features shall meet the following general requirements for all fire areas that contain or present a fire hazard to structures, systems, or components important to safety.

1. In situ fire hazards shall be identified and suitable protection provided.
2. Transient fire hazards associated with normal operation, maintenance, repair, or modification activities shall be identified and eliminated where possible. Those transient fire hazards that can not be eliminated shall be controlled and suitable protection provided.
3. Fire detection systems, portable extinguishers, and standpipe and hose stations shall be installed.
4. Fire barriers or automatic suppression systems or both shall be installed as necessary to protect redundant systems or components necessary for safe shutdown.
5. A site fire brigade shall be established, trained, and equipped and shall be on site at all times.
6. Fire detection and suppression systems shall be designed, installed, maintained, and tested by personnel properly qualified by experience and training in fire protection systems.
7. Surveillance procedures shall be established to ensure that fire barriers are in place and that fire suppression systems and components are operable.

D. **Alternative or Dedicated Shutdown Capability**

In areas where the fire protection features cannot ensure safe shutdown capability in the event of a fire in that area,

alternative or dedicated safe shutdown capability shall be provided.

III. SPECIFIC REQUIREMENTS

A. Water Supplies for Fire Suppression Systems

Two separate water supplies shall be provided to furnish necessary water volume and pressure to the fire main loop.

Each supply shall consist of a storage tank, pump, piping, and appropriate isolation and control valves. Two separate redundant suctions in one or more intake structures from a large body of water (river, lake, etc.) will satisfy the requirement for two separated water storage tanks. These supplies shall be separated so that a failure of one supply will not result in a failure of the other supply.

Each supply of the fire water distribution system shall be capable of providing for a period of 2 hours the maximum expected water demands as determined by the fire hazards analysis for safety-related areas or other areas that present a fire exposure hazard to safety-related areas.

When storage tanks are used for combined service-water/fire-water uses the minimum volume for fire uses shall be ensured by means of dedicated tanks or by some physical means such as a vertical standpipe for other water service. Administrative controls, including locks for tank outlet valves, are unacceptable as the only means to ensure minimum water volume.

Other water systems used as one of the two fire water supplies shall be permanently connected to the fire main system and shall be capable of automatic alignment to the fire main system. Pumps, controls, and power supplies in these systems shall satisfy the requirements for the main fire pumps. The use of other water systems for fire protection shall not be incompatible with their functions required for safe plant shutdown. Failure of the other system shall not degrade the fire main system.

B. Sectional Isolation Valves

Sectional isolation valves such as post indicator valves or key operated valves shall be installed in the fire main

loop to permit isolation of portions of the fire main loop for maintenance or repair without interrupting the entire water supply.

C. **Hydrant Isolation Valves**

Valves shall be installed to permit isolation of outside hydrants from the fire main for maintenance or repair without interrupting the water supply to automatic or manual fire suppression systems in any area containing or presenting a fire hazard to safety-related or safe shutdown equipment.

D. **Manual Fire Suppression**

Standpipe and hose systems shall be installed so that at least one effective hose stream will be able to reach any location that contains or presents an exposure fire hazard to structures, systems, or components important to safety.

Access to permit effective functioning of the fire brigade shall be provided to all areas that contain or present an exposure fire hazard to structures, systems, or components important to safety.

Standpipe and hose stations shall be inside PWR containments and BWR containments that are not inerted. Standpipe and hose stations inside containment may be connected to a high quality water supply of sufficient quantity and pressure other than the fire main loop if plant-specific features prevent extending the fire main supply inside containment. For BWR drywells, standpipe and hose stations shall be placed outside the dry well with adequate lengths of hose to reach any location inside the dry well with an effective hose stream.

E. **Hydrostatic Hose Tests**

Fire hose shall be hydrostatically tested at a pressure of 300 psi or 50 psi above maximum fire main operating pressure, whichever is greater. Hose stored in outside hose houses shall be tested annually. Interior standpipe hose shall be tested every three years.

F. **Automatic Fire Detection**

Automatic fire detection systems shall be installed in all areas of the plant that contain or present an exposure fire

hazard to safe shutdown or safety-related systems or components. These fire detection systems shall be capable of operating with or without offsite power.

G. **Fire Protection of Safe Shutdown Capability**

1. Fire protection features shall be provided for structures, systems, and components important to safe shutdown. These features shall be capable of limiting fire damage so that:

a. One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage; and

b. Systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station(s) can be repaired within 72 hours.

2. Except as provided for paragraph G.3 of this section, where cables or equipment, including associated non-safety circuits that could prevent operation or cause maloperation due to hot shorts, open circuits, or shorts to ground, or redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located within the same fire area outside of primary containment, one of the following means of ensuring that one of the redundant trains is free of fire damage shall be provided:

a. Separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a 3-hour rating. Structural steel forming a part of or supporting such fire barriers shall be protected to provide fire resistance equivalent to that required of the barrier;

b. Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area; or

c. Enclosure of cable and equipment and associated non-safety circuits of one redundant train in a fire barrier having a 1-hour rating. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area;

Inside noninerted containments one of the fire protection means specified above or one of the following fire protection means shall be provided:

d. Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards;

e. Installation of fire detectors and an automatic fire suppression system in the fire area; or

f. Separation of cables and equipment and associated non-safety circuits of redundant trains by a noncombustible radiant energy shield.

3. Alternative or dedicated shutdown capability and its associated circuits,[7] independent of cables, systems or components in the area, room or zone under consideration, shall be provided:

a. Where the protection of systems whose function is required for hot shutdown does not satisfy the requirement of paragraph G.2 of this section; or

b. Where redundant trains of systems required for hot shutdown located in the same fire area may be subject to damage from fire suppression activities or from the rupture or inadvertent operation of fire suppression systems.

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[7] Alternative shutdown capability is provided by rerouting, relocating or modificating of existing systems; dedicated shutdown capability is provided by installing new structures and systems for the function of post-fire shutdown.

In addition, fire detection and a fixed fire suppression system shall be installed in the area, room, or zone under consideration.

H. Fire Brigade

A site fire brigade trained and equipped for fire fighting shall be established to ensure adequate manual fire fighting capability for all areas of the plant containing structures, systems, or components important to safety. The fire brigade shall be at least five members on each shift. The brigade leader and at least two brigade members shall have sufficient training in or knowledge of plant safety-related systems to understand the effects of fire and fire suppressants on safe shutdown capability. The qualification of fire brigade members shall include an annual physical examination to determine their ability to perform strenuous fire fighting activities. The shift supervisor shall not be a member of the fire brigade. The brigade leader shall be competent to assess the potential safety consequences of a fire and advise control room personnel. Such competence by the brigade leader may be evidenced by possession of an operator's license or equivalent knowledge of plant safety-related systems.

The minimum equipment provided for the brigade shall consist of personal protective equipment such as turnout coats, boots, gloves, hard hats, emergency communications equipment, portable lights, portable ventilation equipment, and portable extinguishers. Self-contained breathing apparatus using full-face positive-pressure masks approved by NIOSH (National Institute for Occupational Safety and Health – approval formerly given by the U.S. Bureau of Mines) shall be provided for fire brigade, damage control, and control room personnel. At least 10 masks shall be available for fire brigade personnel. Control room personnel may be furnished breathing air by a manifold system piped from a storage reservoir if practical. Service or rated operating life shall be a minimum of one-half hour for the self-contained units.

At least two extra air bottles shall be located on site for each self-contained breathing unit. In addition, an onsite 6-hour supply of reserve air shall be provided and arranged to

permit quick and complete replenishment of exhausted supply air bottles as they are returned. If compressors are used as a source of breathing air, only units approved for breathing air shall be used; compressors shall be operable assuming a loss of offsite power. Special care must be taken to locate the compressor in areas free of dust and contaminants.

I. **Fire Brigade Training**

The fire brigade training program shall ensure that the capability to fight potential fires is established and maintained. The program shall consist of an initial classroom instruction program followed by periodic classroom instruction, fire fighting practice, and fire drills:

1. **Instruction**

   a. The initial classroom instruction shall include:

      (1) Indoctrination of the plant fire fighting plan with specific identification of each individual's responsibilities.

      (2) Identification of the type and location of fire hazards and associated types of fires that could occur in the plant.

      (3) The toxic and corrosive characteristics of expected products of combustion.

      (4) Identification of the location of fire fighting equipment for each fire area and familiarization with the layout of the plant, including access and egress routes to each area.

      (5) The proper use of available fire fighting equipment and the correct method of fighting each type of fire. The types of fires covered should include fires in energized electrical equipment, fires in cables and cable trays, hydrogen fires, fires involving flammable and combustible liquids or hazardous process chemicals, fires resulting from construction or modifications (welding), and record file fires.

(6) The proper use of communication, lighting, ventilation, and emergency breathing equipment.

(7) The proper method for fighting fires inside buildings and confined spaces.

(8) The direction and coordination of the fire fighting activities (fire brigade leaders only).

(9) Detailed review of fire fighting strategies and procedures.

(10) Review of the latest plant modifications and corresponding changes in fire fighting plans.

b. The instruction shall be provided by qualified individuals who are knowledgeable, experienced, and suitably trained in fighting the types of fires that could occur in the plan and in using the types of equipment available in the nuclear power plant.

c. Instruction shall be provided to all fire brigade members and fire brigade leaders.

d. Regular planned meetings shall be held at least every 3 months for all brigade members to review changes in the fire protection program and other subjects as necessary.

e. Periodic refresher training sessions shall be held to repeat the classroom instruction program for all brigade members over a two-year period. These sessions may be concurrent with the regular planned meetings.

2. Practice

Practice sessions shall be held for each shift fire brigade on the proper method of fighting the various types of fires that could occur in a nuclear power plant. These sessions shall provide brigade members with experience in actual fire extinguishment and the use of emergency breathing apparatus under strenuous conditions encountered in fire fighting. These practice sessions shall be provided at least once per year for each fire brigade member.

3. Drills

   a. Fire brigade drills shall be performed in the plant so that the fire brigade can practice as a team.

   b. Drills shall be performed at regular intervals not to exceed 3 months for each shift fire brigade. Each fire brigade member should participate in each drill, but must participate in at least two drills per year.

      A sufficient number of these drills, but not less than one for each shift fire brigade per year, shall be unannounced to determine the fire fighting readiness of the plant fire brigade, brigade leader, and fire protection systems and equipment. Persons planning and authorizing an unannounced drill shall ensure that the responding shift fire brigade members are not aware that a drill is being planned until it is begun. Unannounced drills shall not be scheduled closer than four weeks.

      At least one drill per year shall be performed on a "back shift" for each shift fire brigade.

   c. The drills shall be preplanned to establish the training objectives of the drill and shall be critiqued to determine how well the training objectives have been met. Unannounced drills shall be planned and critiqued by members of the management staff responsible for plant safety and fire protection. Performance deficiencies of a fire brigade or of individual scheduling additional training for the brigade or members. Unsatisfactory drill performance shall be followed by a repeat drill within 30 days.

   d. At 3-year intervals, a randomly selected unannounced drill shall be critiqued by qualified individuals independent of the licensee's staff. A copy of the written report from such individuals shall be available for NRC review.

e. Drills shall as a minimum include the following:

(1) Assessment of fire alarm effectiveness, time required to notify and assemble fire brigade, and selection, placement and use of equipment, and fire fighting strategies.

(2) Assessment of each brigade member's knowledge of his or her role in the fire fighting strategy for the area assumed to contain the fire. Assessment of the brigade member's conformance with established plant fire fighting procedures and use of fire fighting equipment, including self-contained emergency breathing apparatus, communication equipment, and ventilation equipment, to the extent practicable.

(3) The simulated use of fire fighting equipment required to cope with the situation and type of fire selected for the drill. The area and type of fire chosen for the drill should differ from those used in the previous drill so that brigade members are trained in fighting fires in various plant areas. The situation selected should simulate the size and arrangement of a fire that could reasonably occur in the area selected, allowing for fire development due to the time required to respond, to obtain equipment, and organize for the fire, assuming loss of automatic suppression capability.

(4) Assessment of brigade leader's direction of the fire fighting effort as to thoroughness, accuracy, and effectiveness.

4. Records

Individual records of training provided to each fire brigade member, including drill critiques, shall be maintained for at least 3 years to ensure that each member receives training in all parts of the training program. These records of training shall be available

for NRC review. Retraining or broadened training for fire fighting within buildings shall be scheduled for all those brigade members whose performance records show deficiencies.

J. **Emergency Lighting**

Emergency lighting units with at least an 8-hour battery power supply shall be provided in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto.

K. **Administrative Controls**

Administrative controls shall be established to minimize fire hazards in areas containing structures, systems, and components important to safety. These controls shall establish procedures to:

1. Govern the handling and limitation of the use of ordinary combustible materials, combustible and flammable gases and liquids, high efficiency particulate air and charcoal filters, dry ion exchange resins, or other combustible supplies in safety-related areas.
2. Prohibit the storage of combustibles in safety-related areas or establish designated storage areas appropriate fire protection.
3. Govern the handling of and limit transient fire loads such as combustible and flammable liquids, wood and plastic products, or other combustible materials in buildings containing safety-related systems or equipment during all phases of operating, and especially during maintenance, modification, or refueling operations.
4. Designate the onsite staff member responsible for the in-plant fire protection review of proposed work activities to identify potential transient fire hazards and specify required additional fire protection in the work activity procedure.

5. Govern the use of ignition sources by use of a flame permit system to control welding, flame cutting, brazing, or soldering operations. A separate permit shall be issued for each area where work is to be done. If work continues over more than one shift, the permit shall be valid for not more than 24 hours when the plant is operating or for the duration of a particular job during plant shutdown.
6. Control the removal from the area of all waste, debris, scrap, oil spills, or other combustibles resulting from the work activity immediately following completion of the activity, or at the end of each work shift, whichever comes first.
7. Maintain the periodic housekeeping inspections to ensure continued compliance with these administrative controls.
8. Control the use of specific combustibles in safety-related areas. All wood used in safety-related areas during maintenance, modification, or refueling operations (such as lay-down blocks or scaffolding) shall be treated with a flame retardant. Equipment or supplies (such as new fuel) shipped in untreated combustible packing containers may be unpacked in safety-related areas if required for valid operating reasons. However, all combustible materials shall be removed from the area immediately following the unpacking. Such transient combustible material, unless stored in approved containers, shall not be left unattended during lunch breaks, shift changes, or other similar periods. Loose combustible packing material such as wood or paper excelsior, or polyethylene sheeting shall be placed in metal containers with tight-fitting self-closing metal covers.
9. Control actions to be taken by an individual discovering a fire, for example, notification

or control room, attempt to extinguish fire, and actuation of local fire suppression systems.

10. Control actions to be taken by the control room operator to determine the need for brigade assistance upon report of a fire or receipt of alarm on control room annunciator panel, for example, announcing location of fire over PA system, sounding fire alarms, and notifying the shirt supervisor and the fire brigade leader of the type, size, and location of the fire.

11. Control actions to be taken by the fire brigade after notification by the control room operator of a fire, for example, assembling in a designated location, receiving directions from the fire brigade leader, and discharging specific fire fighting responsibilities including selection and transportation of fire fighting equipment to fire location, selection of protective equipment, operating instructions for use of fire suppression systems, and use of preplanned strategies for fighting fires in specific areas.

12. Define the strategies for fighting fires in all safety-related areas and areas presenting a hazard to safety-related equipment. These strategies shall designate:

    a. Fire hazards in each area covered by the specific prefire plans.

    b. Fire extinguishants best suited for controlling the fires associated with the fire hazards in that area and the nearest location of these extinguishants.

    c. Most favorable direction from which to attack a fire in each area in view of the ventilation direction, access hallways, stairs, and doors that are most likely to be free of fire, and the best station or elevation for

fighting the fire. All access and egress routes that involve locked doors should be specifically identified in the procedure with the appropriate precautions and methods for access specified.

d. Plant systems that should be managed to reduce the damage potential during a local fire and the location of local and remote controls for such management (e.g., any hydraulic or electrical systems in the zone covered by the specific fire fighting procedure that could increase the hazards in the area because of overpressurization or electrical hazards).

e. Vital heat-sensitive system components that need to be kept cool while fighting a local fire. Particularly hazardous combustibles that need cooling should be designated.

f. Organization of fire fighting brigades and the assignment of special duties according to job title so that all fire fighting functions are covered by any complete shift personnel complement. These duties include command control of the brigade, transporting fire suppression and support equipment to the fire scenes, applying the extinguishant to the fire, communication with the control room, and coordination with outside fire departments.

g. Potential radiological and toxic hazards in fire zones.

h. Ventilation system operation that ensures desired plant air distribution when the ventilation flow is modified for fire containment or smoke clearing operations.

i. Operations requiring control room and shift engineer coordination or authorization.

j. Instructions for plant operators and general plant personnel during fire.

L. Alternative and Dedicated Shutdown Capability

1. Alternative or dedicated shutdown capability provided for a specific fire area shall be able to achieve and maintain subcritical reactivity conditions in the reactor, maintain reactor coolant inventory, achieve and maintain hot standby[8] conditions for a PWR (hot shutdown[8] for a BWR) and achieve cold shutdown[8] conditions within 72 hours and maintain cold shutdown conditions thereafter. During the postfire shutdown, the reactor coolant system process variables shall be maintained within those predicted for a loss of normal a.c. power, and the fission product boundary integrity shall not be affected; i.e., there shall be no fuel clad damage, rupture of any primary coolant boundary, or rupture of the containment boundary.

2. The performance goals for the shutdown functions shall be:

a. The reactivity control function shall be capable of achieving and maintaining cold shutdown reactivity conditions.

b. The reactor coolant makeup function shall be capable of maintaining the reactor coolant level above the top of the core for BWRs and be within the level indication in the pressurizer for PWRs.

c. The reactor heat removal function shall be capable of achieving and maintaining decay heat removal.

d. The process monitoring function shall be capable of providing direct readings of the process variables necessary to perform and control the above functions.

e. The supporting functions shall be capable of providing the process cooling, lubrication, etc., necessary to permit the operation of the equipment used for safe shutdown functions.

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[8] As defined in the Standard Technical Specifications.

3. The shutdown capability for specific fire areas may be unique for each such area, or it may be one unique combination of systems for all such areas. In either case, the alternative shutdown capability shall be independent of the specific fire area(s) and shall accommodate postfire conditions where offsite power is available and where offsite power is not available for 72 hours. Procedures shall be in effect to implement this capability.

4. If the capability to achieve and maintain cold shutdown will not be available because of fire damage, the equipment and systems comprising the means to achieve and maintain the hot standby or hot shutdown condition shall be capable of maintaining such conditions until cold shutdown can be achieved. If such equipment and systems will not be capable of being powered by both onsite and offsite electric power systems because of fire damage, an independent onsite power system shall be provided. The number of operating shift personnel, exclusive of fire brigade members, required to operate such equipment and systems shall be on site at all times.

5. Equipment and systems comprising the means to achieve and maintain cold shutdown conditions shall not be damaged by fire; or the fire damage to such equipment and systems shall be limited so that the systems can be made operable and cold shutdown achieved within 72 hours. Materials for such repairs shall be readily available on site and procedures shall be in effect to implement such repairs. If such equipment and systems used prior to 72 hours after the fire will not be capable of being powered by both onsite and offsite electric power systems because of fire damage, an independent onsite power system shall be provided. Equipment and systems used after 72 hours may be powered by offsite power only.

6. Shutdown systems installed to ensure postfire shutdown capability need not be designed to meet seismic Category I criteria, single failure criteria, or other design basis accident criteria, except where required for other reasons, e.g., because of interface with or impact on existing safety systems, or because of adverse valve actions due to fire damage.

7. The safe shutdown equipment and systems for each fire area shall be known to be isolated from associated

non-safety circuits in the fire area so that hot shorts, open circuits, or shorts to ground in the associated circuits will not prevent operation of the safe shutdown equipment. The separation and barriers between trays and conduits containing associated circuits of one safe shutdown division and trays and conduits containing associated circuits or safe shutdown cables from the redundant division, or the isolation of these associated circuits from the safe shutdown equipment, shall be such that a postulated fire involving associated circuits will not prevent safe shutdown.[9]

M. Fire Barrier Cable Penetration Seal Qualification

Penetration seal designs shall utilize only noncombustible materials and shall be qualified by tests that are comparable to tests used to rate fire barriers. The acceptance criteria for the test shall include:

1. The cable fire barrier penetration seal has withstood the fire endurance test without passage of flame or ignition of cables on the unexposed side for a period of time equivalent to the fire resistance rating required of the barrier;

2. The temperature levels recorded for the unexposed side are analyzed and demonstrate that the maximum temperature is sufficiently below the cable insulation ignition temperature; and

3. The fire barrier penetration seal remains intact and does not allow projection of water beyond the unexposed surface during the hose stream test.

N. Fire Doors

Fire doors shall be self-closing or provided with closing mechanisms and shall be inspected semiannually to verify that automatic hold-open, release, and closing mechanisms and latches are operable.

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[9] An acceptable method of complying with this alternative would be to meet Regulatory Guide 1.75 position 4 related to associated circuits and IEEE Std 384-1974 (Section 4.5) where trays from redundant safety divisions are so protected that postulated fires affect trays from only one safety division.

One of the following measures shall be provided to ensure they will protect the opening as required in case of fire:

1. Fire doors shall be kept closed and electrically supervised at a continuously manned location;

2. Fire doors shall be locked closed and inspected weekly to verify that the doors are in the closed position;

3. Fire doors shall be provided with automatic hold-open and release mechanisms and inspected daily to verify that doorways are free of obstructions; or

Fire doors shall be kept closed and inspected daily to verify that they are in the closed position.

The fire brigade leader shall have ready access to keys for any locked fire doors.

Areas protected by automatic total flooding gas suppression systems shall have electrically supervised self-closing fire doors or shall satisfy option 1 above.

O. Oil Collection System for Reactor Coolant Pump

The reactor coolant pump shall be equipped with an oil collection system if the containment is not inerted during normal operation. The oil collection system shall be so designed, engineered, and installed that failure will not lead to fire during normal or design basis accident conditions and that there is reasonable assurance that the system will withstand the Safe Shutdown Earthquake.[10]

Such collection systems shall be capable of collecting lube oil from all potential pressurized and unpressurized leakage sites in the reactor coolant pump lube oil systems. Leakage shall be collected and drained to a vented closed container that can hold the entire lube oil system inventory. A flame arrester is required in the vent if the flash point characteristics of the oil present the hazard of fire flashback. Leakage points to be protected shall include lift pump and piping, overflow lines, lube oil cooler, oil fill and drain lines and plugs, flanged connections on oil lines, and lube oil reservoirs where such

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[10] See Regulatory Guide 1.29 – "Seismic Design Classification" Paragraph C.2.

features exist on the reactor coolant pumps. The drain line shall be large enough to accommodate the largest potential oil leak.

(Sec. 161b, Pub. Law 83-703, 68 Stat. 948; Sec. 201, Pub. Law 93-438, 88 Stat. 1242 (42 U.S.C. 2201(b), 5841).)

Dated at Washington, D.C. this 17th day of November 1980.

For the Nuclear Regulatory Commission.

Samuel J. Chilk
Secretary of the Commission

APPENDIX C

PROPOSED RULE OF THE NUCLEAR REGULATORY COMMISSION

(Docketed May 22, 1980)

U. S. NUCLEAR REGULATORY COMMISSION
10 CFR Part 50

Fire Protection Program for Nuclear Power Plants Operating Prior to January 1, 1979

AGENCY: U. S. Nuclear Regulatory Commission

ACTION: Proposed Rule

SUMMARY: The Nuclear Regulatory Commission (NRC) is proposing to amend its regulations to require certain minimum provisions for fire protection in operating nuclear power plants.

DATES: Comment period expires June 30, 1980. The position of the staff and the licensees regarding the provisions of this rule is documented and well known. In addition, the public has been afforded several opportunities to comment on the provisions of the rule during two extensive comment periods and in open meetings with the ACRS in which a regulatory guide on fire protection was considered. For these reasons no extension of the comment period will be granted. Further, since the issues involved are well known and have been under discussion for several years, the Commission does not anticipate changes in the rule's action deadline as a result of further comments received.

ADDRESSES: Written comments should be submitted to the Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Docketing and Service Branch.

FOR FURTHER INFORMATION CONTACT: David P. Notley, Office of Standards Development, U. S. Nuclear Regulatory Commission, Washington, D.C. 20555, phone 301-443-5921.

SUPPLEMENTARY INFORMATION: On March 22, 1975, the Browns Ferry Nuclear Power Plant, owned and operated by the Tennessee Valley Authority, had the worst fire to date in an operating commercial nuclear power plant. The fire was eventually controlled, there was no release of radio active material to the environment, and the reactor was safely shut down. However, many of the systems relied on for shutdown of the reactor under both normal and emergency conditions were not available because of extensive damage to control cabling of redundant systems. Although this fire was not a particularly large or serious fire in terms of insurance underwriting loss, it was very serious in terms of the type of equipment that was rendered inoperative. Also of concern following this fire was the attitude and belief among those responsible for managing the fire that water should not be used on burning electrical cables because the resultant electrical faults would be worse than the fire damage. As a consequence, the fire was allowed to burn for more than seven hours before it was extinguished with water.

Two recommendations made by the Special Review Group that investigated the Browns Ferry fire pertained to assurance that the fire protection programs at operating nuclear power plants conform to General Design Criterion 3, Fire Protection, contained in Appendix A to this part (GDC 3). One of the recommendations was that NRC should develop additional specific guidance for implementation of GDC 3 requirements. The other was that NRC should make a detailed review of the fire protection program at each operating plant comparing it to the guidance developed per the above recommendation.

In response to the first recommendation, NRR developed Branch Technical Position Auxiliary Power Conversion Systems Branch 9.5-1 (BTP 9.5-1), "Guidelines for Fire Protection for Nuclear Power Plants" and Appendix A to BTP 9.5-1, "Guidelines for Fire Protection For Nuclear Power Plants Docketed Prior to July 1, 1976."[1] The guidance contained in BTP 9.5-1 was published for public comment in June 1976 as Regulatory Guide 1.120, "Fire Protection Guidelines for Nuclear Power

[1] Branch Technical Position 9.5–1 and its Appendix A are available from David P. Notley, Office of Standards Development.

Plants." As a result of public comments received, the staff proposed extensive changes to the guide and presented the proposed changes to the ACRS in an open meeting in May 1977. Additional written comments were solicited from the public following that meeting. Nineteen additional comment letters were received and they were also considered in Revision 1 of Regulatory Guide 1.120, which was published for a new one-year public comment period in November 1977. Comments received on Revision 1 of Regulatory Guide 1.120 were generally restatements of comments received during earlier comment periods and had already been considered and evaluated by the staff.

The guidelines in both the BTP 9.5-1 and Appendix A to BTP 9.5-1 were developed to provide a fire protection program that has two basic objectives:

1. to identify and distinguish between those consequences of fire that are acceptable and those consequences that are not.
2. to provide necessary means to minimize all consequences of fire and to prevent unacceptable consequences from occurring.

With respect to the first objective, the phenomenon of fire is believed to be sufficiently well understood to permit evaluation of existing and potential fire hazards and probable extent of damage should a fire occur. Such evaluations are useful in assessing the possible consequences of fire in a given area. However, the phenomenon of fire is so unpredictable in occurrence and development that measures to prevent unacceptable consequences may not be omitted on the basis of low probability of occurrence. The minimum fire protection requirements for nuclear power plants must be established not only to identify fire hazards but also to protect against unacceptable consequences of fire.

In response to the second recommendation of the Special Review Group, the NRC requested every operating plant to (1) compare its fire protection program with the above guidelines and (2) analyze the consequences of fire in each plant area. The NRC then reviewed the licensee's analysis against the guidance contained in Appendix A to BTP 9.5-1 and visited each plant to examine the relationship of the structures, systems, and

components important to safety with both in situ and transient fire hazards, the potential consequences of fire, and the associated fire protection features.

Appendix A to BTP 9.5-1 has been used by the staff as a basis for evaluating the adequacy of fire protection provided at all of the presently operating nuclear power plants in the United States. Most of the licensees have accepted most of the staff positions and interpretations of this Appendix A. However, 17 generic issues exist in the fire protection safety analysis reports for 32 plants where agreement has not been reached between the staff and some licensees. In each case the disagreement turns on how to satisfy the basic protection requirement. For instance, all agree on the need for a fire brigade on all shifts. The disagreement is "how large?" The staff says that five should be the minimum size permitted while some licensees say that a brigade of only three or four will be adequate. Similar disagreements exist with each of the basic requirements covered by this proposed rule. Where the staff's safety evaluations contain open items, the position of the staff and the licensees are documented and well known.

There are, however, a few instances where the staff has accepted certain fire protection alternatives that would not satisfy some of the requirements of this proposed rule. The minimum requirements contained in this rule were developed over a 3 year period and, in each of these instances, the staff accepted a proposed alternative before these minimum requirements were established. All licensees will be expected to meet the requirements of this rule, in its effective form, including whatever changes result from public comments.

Because of the above-mentioned differences between the staff and the licensees in the interpretation of the staff's guidelines, it it timely and necessary for the Commission to state what the minimum fire protection requirements will be in each of these contested areas of concern. This proposed rule and its Appendix R have been developed to establish the minimum acceptable fire protection requirements necessary to resolve these contested areas of concern for nuclear power plants operating prior to January 1, 1979.

Other fire protection criteria that have been used by the staff during its plant-specific fire protection program reviews are contained in Appendix A to BTP 9.5-1. The combination of the guidance contained in Appendix A to BTP 9.5-1 and the requirements set forth in this proposed rule define the essential elements for an acceptable fire protection program at nuclear power plants docketed for Construction Permit prior to July 1, 1976, for demonstration of compliance with General Design Criterion 3 of Appendix A to 10 CFR Part 50. Similar acceptable guidance is provided in BTP 9.5-1 for nuclear power plants docketed for Construction Permit after July 1, 1976.

All modifications (except for alternate or dedicated shutdown capability) would be required to be implemented by November 1, 1980, unless for good cause shown the Commission approves an extension. Since the issues involved are well-known and have been under discussion for several years, the Commission anticipates approving few, if any, extensions. No plant would be allowed to continue operating after November 1, 1980, or beyond an extended date approved by the Commission, unless all modifications (except for alternate or dedicated shutdown capability) have been implemented. The Commission recognizes that, in a few instances, approval has previously been given to particular licensees to extend the implementation dates for some modifications beyond November 1, 1980. The Commission will review these extensions on a case-by-case basis to determine whether continued approval or some revision of the extension is appropriate.

For alternate or dedicated shutdown capability, the proposed rule specifies implementation deadlines which depend on which kind of capability is to be implemented and whether the plant is under review in the Systematic Evaluation Program (SEP).[2] For non-SEP plants, the proposed implementation deadlines are April 1, 1981 for alternate shutdown capability and December 1, 1981 for dedicated shutdown capability. Licensees who have committed to earlier implementation dates

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[2] Plants under review in the SEP include Palisades, Dresden 1 and 2, Oyster Creek, Millstone 1, Ginna Haddem Neck, San Onofre 1, La Crosse, Big Rock Point, and Yankee Rowe.

will be expected to meet those commitments. For SEP plants, the proposed implementation deadlines are December 1, 1981 for alternate shutdown capability and October 1, 1982 for dedicated shutdown capability. The proposed rule requires licensees to submit plans and schedules to meet these implementation deadlines by August 1, 1980 (non-SEP plants) and November 1, 1980 (SEP plants). The Commission may revise the implementation deadlines for SEP plants to earlier dates following completion by the NRC staff of its review of the status of fire protection at those plants. The staff review is expected to be completed in August 1980.

(SEPARATE COMMENTS OF COMMISSIONERS HENDRIE AND KENNEDY:)

"We agree with the fire safety provisions of the proposed Appendix R to 10 CFR Part 50. However, we do not agree with the implementation schedule that the Commission proposes. In its original presentation of this rule to the Commission, the staff proposed a schedule which we believe is more reasonable.

"In the absence of Three Mile Island and the actions we have required, the short schedule the Commission proposes might be appropriate in view of the extended period during which a number of these fire safety provisions have been under discussion. In the present situation, the Commission has properly imposed a large number of Three Mile Island-related safety requirements on operating nuclear power plants. We are concerned that the short implementation schedule proposed here for fire safety provisions, together with the large workload associated with the Three Mile Island requirements, may make it impossible for licensees to complete all of these measures in a carefully considered and thorough fashion. Since all operating plants have implemented a number of improvements in their fire safety postures, the remaining improvements to be required under the proposed rule do not seem to us so urgent as to require either shutting down of plants because of inability to complete these requirements on the short schedule proposed or to make those improvements in a hasty fashion.

"We note also that the proposed implementation schedule would require licensees to submit their plans for complying

with this rule by August 1, 1980. Considering that staff has said it will not be able to complete its plant-by-plant reviews to determine specific requirements until July 1980, some licensees will simply not have any reasonable time to make an adequate plan."

A brief description of the major parts of the proposed rule, including the need for each of the specific requirements, follow.

I. Introduction and Scope

This section states that the basic objective of the proposed Appendix R is to specify the minimum fire protection requirements with respect to certain recurring generic issues for nuclear power plants operating prior to January 1, 1979. It limits application to commercial nuclear power electric generating stations and also states that the proposed Appendix R does not rescind any requirements set forth in any Safety Evaluation Report for any nuclear power facility.

II. General Requirements

This section states in general terms the need for a comprehensive fire protection program at each nuclear power plant.

A. Fire Protection Program

The concept of defense in depth is here extended to fire protection (1) to prevent fires from starting, (2) to rapidly detect, control, and promptly extinguish those fires that do occur, and (3) to arrange the structures, systems, and components important to safety so that a fire that starts in spite of the fire prevention activities and that is not promptly extinguished by the fixed automatic or manual fire suppression activities will not prevent the safe shutdown of the plant.

B. Loss of Offsite Power

This section requires that any fire detection or suppression system protecting systems necessary to achieve and maintain safe plant shutdown be capable of functioning with or without offsite power.

C. Manual Fire Fighting

This section requires that manual fire fighting capability (a fire brigade) be provided in all areas containing or

presenting a fire hazard to structures, systems, or components important to safety.

D. **Access for Manual Fire Fighting**

This section requires that access for effective functioning of the fire brigade be provided in all areas containing or presenting a fire hazard to structures, systems, or components important to safety.

E. **Fire Hazard Analysis**

This section requires that the adequacy of fire protection provided in any area to ensure the ability (1) to safely shut down the plant or (2) to minimize and control the release of radioactivity to the environment be determined by analysis of the effects of fires on structures, systems, or components important to safety in the area.

III. **Specific Requirements**

Each of the 17 specific fire protection requirements in the proposed Appendix R is described below.

A. **Fire Water Distribution System**

Two of the lessons learned from the Browns Ferry Fire are (1) that water is the best extinguishing agent available for most potential fires in nuclear power plants and (2) that the sooner a fire is extinguished, the less total damage results. These two statements recognize that extenuating circumstances in operating plants may preclude the indiscriminate use of water to fight fires in particular locations; however, such circumstances are exceptions. In practical terms, this means that fires in electrical equipment (which may be subject to water damage) should be extinguished as quickly as possible. Water may not be excluded from an area as a fire extinguishant merely on the basis of potential water damage to safe shutdown equipment. If such water damage hazard is severe, other protective measures such as shields for equipment or alternate shutdown capability would be required.

A separate fire water distribution system would be required at each plant to ensure the necessary water supply with adequate pressure and volume for any combination of automatic and manual fire suppression demands.

A looped fire main with appropriate isolation valves provides a higher reliability of furnishing this necessary water

supply to fire suppression systems by providing alternate directions of flow during maintenance or repair on part of the system.

Similarly, at least two water sources—tanks and pumps, or pumps alone from a large body of water such as a lake or a river—are necessary to ensure continuity of water supply. In the case of two intakes from a single large body of water, the intakes must be separated from each other so as to really ensure two separate sources.

B. **Sectional Control Valves**

This item requires the installation of approved visually indicating sectional control valves, such as Post Indicator Valves, to isolate portions of the fire main for maintenance or repair without shutting off the entire system.

C. **Hydrant Block Valves**

This item requires block valves to be installed in hydrant laterals if necessary to isolate a hydrant from the yard main without interrupting fire water supply to areas containing safety-related or safe shutdown equipment.

D. **Manual Fire Suppression**

This item requires that a standpipe system with an adequate number of hose stations located throughout the plant to ensure that all areas containing safety-related cabling and equipment can be reached with at least one effective hose stream. The staff has relied on physical separation of safety-related cables and equipment and has made extensive use of automatic fire detection and suppression systems for additional protection of safety-related cabling and equipment. The staff recognizes, however, the limits of automatic fire protection systems, and that such automatic protection, especially coupled with physical separation, is not always feasible in operating plants. Prudence therefore dictates that manual firefighting capability be available throughout the plant to increase the overall realiability of fire suppression capability.

E. **Hydrostatic Hose Tests**

This item describes the frequency and severity of hydrostatic tests to which all plant fire hose must be subjected in order to have reasonable assurance that it will function properly without rupture when needed during a fire.

F. **Automatic Fire Detection**

This item requires automatic fire detection systems in areas containing combustibles and safe shutdown or safety-related systems or components, in order to provide prompt notification and alarm in the event of fire in these areas. This will permit prompt response by the fire brigade to enable speedy extinguishment in those areas not protected by automatic fire suppression systems and may enable the brigade to control fires in areas that are so protected before the automatic systems operate.

G. **Protection of Safe Shutdown Capability**

A wide spectrum of fire hazards and shutdown equipment subject to fire damage exists in operating nuclear power plants. This item lists several parameters (the combination of fire hazards, the susceptibility of safe shutdown equipment to damage from both fire and fire suppression activities, fire suppression means available, and availability of alternate shutdown capability) that must be considered in evaluating the effectiveness of fire protection in areas containing safe shutdown equipment. Table 1 gives a summary of various conditions that mandate installation of manual or automatic fixed fire suppression systems.

H. **Fire Brigade**

The need for manual firefighting capability as backup to automatic fire detection and fixed fire suppression systems is established in Item D, which requires that a standpipe and hose system be installed to provide at least one effective hose stream in each area of the plant containing safety-related or safe shutdown equipment. This item specifies the minimum shift fire brigade size necessary to give reasonable assurance of effective manual firefighting capability. It requires that at least five persons be assigned to the fire brigade on each shift and that these persons have no duties during a fire except those directly related to manual firefighting. It further requires that the brigade leader and at least two brigade members be operations personnel, and that the brigade leader be competent to assess potential safety consequences of a fire and advise control room personnel. It also states some of the equipment that is to be provided for the brigade members.

I. **Fire Brigade Training**

This item requires that training be provided for each individual brigade member and each shift brigade as a team in order to ensure the necessary high degree of proficiency required of a fire brigade during emergency response to an actual fire. The type and frequency of such training (classroom instruction, hands on practice sessions, and simulated drills) is specified.

J. **Emergency Lighting**

This item requires that emergency lighting from individual eight-hour battery-powered units be provided in those areas needed for operation of safe shutdown equipment and access routes to safety-related areas. Fire may damage normal lighting in areas other than the area of the fire. Such other areas may contain equipment or controls necessary for safe shutdown of the reactor. Emergency lighting is to be installed in all such areas in order to facilitate operation of such equipment by operations personnel other than the fire brigade in the event of loss of normal lighting due to fire.

K. **Administrative Controls**

The first goal of a fire protection program is fire prevention. Therefore, this item specifies a number of administrative controls in an effort to control the more common types of hazards. In addition, certain responses to fire by the plant fire brigade and other plant (operations) personnel are also specified.

L. **Alternate Shutdown Systems**

This item requires that an alternate means of bringing the reactor to a safe shutdown be provided if the provision of other fire protection does not give assurance that safe shutdown capability will survive a fire.

M. **Fire Barriers**

This item discusses the need for fire barriers and the need to seal or close openings through fire barriers using fire doors, dampers, or penetration sealants depending on the type of opening. It discusses the need to close such openings in order to maintain the required fire resistance rating of the barrier.

N. **Fire Barrier Penetration Seal Qualification**

Openings are frequently required in fire barriers to permit passage of cable trays and conduits from one area to another. Such openings are degradations of the barrier and, per the requirements of Item M, are to be sealed with material that has fire retardant properties at least equal to that required of the unpierced barrier. This item describes the testing procedures that must be used to verify adequacy of a given penetration seal design.

O. **Fire Doors**

Personnel access openings in fire barriers require fire door closures with fire retardant properties at least equal to that required of the unpierced barrier. This item describes acceptable alternative methods to ensure that fire doors will be closed in the event of fire.

P. **Reactor Coolant Pump Lubrication System**

The lubrication system for the reactor coolant pumps represents the largest single fire hazard inside containment. This item describes the arrangement of automatic fire suppression or oil collection systems that are to be provided for protection of this hazard.

Q. **Associated Circuits**

This item specifies the level of fire protection to be provided for electrical circuits that are not themselves safety circuits but that are associated with safety circuits.

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, as amended, and section 553 of title 5 of the United States Code, notice is hereby given that adoption of the following amendments to 10 CFR Part 50 is contemplated.

PART 50 – DOMESTIC LICENSING OF PRODUCTION AND UTILIZATION FACILITIES

1. A new Section 50.48 is added to read as follows:

§ 50.48 Fire Protection.

(a) Each operating nuclear power facility shall have a fire protection plan which meets the requirements of Criterion 3 of

Appendix A to this part. This fire protection plan should consist of two sections. The first section should describe the overall fire protection program for the facility, identify the various positions within the licensee's organization that are responsible for the program, state the authorities that are delegated to each of these positions to implement those responsibilities, and outline the plans for fire protection, fire detection and suppression capability, and limitation of fire damage. The second section should describe specific features necessary to implement the first section, such as: administrative controls and personnel requirements for fire prevention and manual fire suppression activities; automatic and manually operated fire detection and suppression systems; and means to ensure capability to safely shutdown the plant in spite of fire damage to safety related or safe shutdown structures, systems or components.

(b) For nuclear power facilities that commenced operation prior to January 1, 1979, appropriate portions of Criterion 3 of Appendix A to this part will be satisfied by meeting the requirements contained in Appendix R to this part.[3]

(c) All fire protection modifications identified by the staff as necessary to satisfy Criterion 3 of Appendix A to this part, whether contained in Appendix R to this part or in other staff fire protection guidance (except for alternate or dedicated shutdown capability) shall be completed by November 1, 1980 unless, for good cause shown, the Commission approves an extension. For alternate or dedicated shutdown capability, the following implementation schedule will apply.

(i) **Plants not included in the Systematic Evaluation Program (SEP)**: Licensees implementing alternate shutdown capability shall complete implementation by April 1, 1981. Licensees who have previously

[3] The combination of the guidance contained in Appendix A to Branch Technical Position 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976," as implemented by the staff in its plant-specific fire protection program reviews of operating nuclear power plants, and the requirements set forth in Appendix R to this Part define the minimum necessary conditions for demonstration of compliance with General Design Criterion 3 of Appendix A to this Part for nuclear power facilities that commenced operation prior to January 1, 1979.

committed to earlier implementation dates will be expected to meet the earlier dates. Licensees implementing dedicated shutdown capability shall complete implementation by December 1, 1981. Licensees shall submit, by August 1, 1980, plans and schedules for meeting these implementation deadlines.

(ii) **Plants included in the SEP:** Licensees implementing alternate shutdown capability shall complete implementation by December 1, 1981; licensees implementing dedicated shutdown shall complete implementation by October 1, 1982. Licensees shall submit, by November 1, 1980, plans and schedules for meeting these implementation deadlines. The Commission may revise those implementation deadlines to earlier dates following completion by the NRC staff of its review of the status of fire protection at SEP plants. The staff review is expected to be completed in August, 1980.

2. A new Appendix R to 10 CFR Part 50 is added to read as follows:

APPENDIX R – FIRE PROTECTION PROGRAM FOR NUCLEAR POWER FACILITIES OPERATING PRIOR TO JANUARY 1, 1979

I. INTRODUCTION AND SCOPE

This Appendix sets forth the minimum fire protection requirements needed for nuclear power facilities to satisfy Criterion 3 of Appendix A to this part with respect to certain recurring generic issues for nuclear power plants that were operating prior to January 1, 1979.

This Appendix applies only to licensed commercial nuclear power electric generating stations operating prior to January 1, 1979; it does not apply to production reactors, test reactors, research reactors, or other licensed or unlicensed reactors used for other than electric power production.

This Appendix does not rescind any requirements set forth in any Safety Evaluation Report for any nuclear power facility.

II. GENERAL REQUIREMENTS

A. Fire Protection Program

A fire protection program shall be established at each plant. The program shall establish the fire protection policy for the protection of structures, systems, and components important to safety at each plant and the procedures, equipment, and personnel required to implement the program at the plant site.

The fire protection program shall be under the direction of an individual who has been delegated authority commensurate with the responsibilities of the position. The individual shall be knowledgeable in both fire protection and nuclear safety.

The fire protection program shall extend the concept of defense in depth to fire protection with the following objectives:

- to prevent fires from starting;
- to detect rapidly, control and extinguish promptly those fires that do occur;
- to arrange the structures, systems, and components important to safety so that a fire that starts in spite of the fire prevention activities and that is not promptly extinguished by the fixed automatic or manual fire suppression activities will not prevent the safe shutdown of the plant.

The fire protection program shall consist of an integrated effort of procedures, equipment, and personnel necessary to carry out the three-part defense-in-depth concept for each fire area containing combustibles and containing or presenting a fire hazard to structures, systems, and components important to safety. Measures for fire prevention; fire detection, suppression, and containment; and alternate shutdown capability shall be provided for each such area as follows:

1. **Fire Prevention**

   a. In situ fire hazards shall be minimized by design and plant arrangement.

b. Transient fire hazards associated with normal operation, maintenance, repair, or modification activities shall be identified and minimized. Those transient fire hazards that can not be eliminated shall be controlled.

2. **Fire Detection, Suppression, and Containment**

a. Fire detection systems shall be installed.

b. Portable extinguishers and standpipe and hose stations shall be installed.

c. Manually actuated fixed suppression systems shall be installed where fire hazards of grouped electrical cables are large or access for the fire brigade is restricted.

d. A site fire brigade shall be established, trained, and equipped.

e. Automatic suppression systems shall be provided to control large fire hazards or to protect redundant systems or components important to safe shutdown.

f. Fire retardants, heat shields, or local fire barriers shall be provided where physical separation between redundant safe shutdown systems and components or between such systems and fire hazards is not adequate to ensure that automatic and manual fire suppression can limit the fire damage to one division of shutdown systems.

g. Fire barriers surrounding each fire area shall have a 3-hour fire rating unless the fire hazards analysis demonstrates that a lesser rating exceeds the duration of the in situ fire load by at least one-half hour.

h. Fire detection and suppression systems shall be designed, installed, maintained and tested by personnel properly qualified by experience and training in fire protection systems.

i. Surveillance procedures shall be established to ensure that fire barriers and automatic and

manual fire suppression systems and components are operable.

3. **Alternate Shutdown Capability**

Alternate shutdown capability shall be provided when safe shutdown cannot be ensured by barriers and detection and suppression systems, because of the exposure of redundant safe shutdown equipment, cabling, or components in a single fire area to an exposure fire, fire suppression activities, or rupture or inadvertent operation of fire suppression systems.

B. **Loss of Offsite Power**

Fire detection and suppression systems protecting systems necessary to achieve and maintain safe plant shutdown shall be capable of functioning with or without offsite power.

C. **Manual Fire Fighting**

Manual fire fighting capability shall be provided in all areas containing or presenting a fire hazard to structures, systems, or components important to safety.

D. **Access for Manual Fire Fighting**

Access shall be provided to all areas containing or presenting a fire hazard to structures, systems, or components important to safety to permit effective functioning of the fire brigade.

E. **Fire Hazard Analysis**

The adequacy of fire protection for any particular plant area shall be determined by analysis of the effects of postulated exposure fires involving both in situ and transient combustibles on the ability to safely shut down the reactor, or the ability to minimize and control the release of radioactivity to the environment. Separation of redundant systems and components by three-hour rated fire barriers or at least 50 feet both horizontal and vertical of clear air space shall be deemed adequate. Lesser ratings or distances shall be justified by analysis or test.

III. SPECIFIC REQUIREMENTS

A. Fire Water Distribution System

An underground yard fire main loop shall distribute fire protection water from the fire water supplies to the automatic and manual suppression systems. Two fresh water supplies shall be provided to furnish necessary water volume and pressure to the yard fire main loop. Each supply shall consist of a storage tank, pump, piping, and appropriate isolation and control valves. These supplies shall be separated so that a failure of one supply will not result in a failure of the other supply.

Two separate redundant suctions from a large body of fresh water will satisfy the requirement for two separated water storage tanks.

Each supply of the fire water distribution system shall be capable of providing for a period of 2 hours the maximum expected water demands as determined by the fire hazards analysis for safety-related areas or other areas that present a fire exposure hazard to safety-related areas.

Minimum fire water storage shall be ensured by means of dedicated tanks or by means of a vertical standpipe for other water-service when storage tanks are used for combined service-water/fire-water uses.

Other water systems used as a fire water supply shall be permanently connected to the fire main system and shall be capable of automatic alignment to the fire main system. Pumps, controls, and power supplies in these systems shall satisfy the requirements for the main fire pumps. The use of other water systems for fire protection shall not be incompatible with their functions required for safe plant shutdown. Failure of the other system shall not degrade the fire main system.

B. Sectional Control Valves

Approved visually indicating sectional control valves such as Post Indicator Valves shall be provided to isolate portions of the fire main for maintenance or repair without shutting off the entire system.

C. Hydrant Block Valves

Block valves shall be installed in hydrant laterals if necessary to permit isolation of outside hydrants from the

TABLE 1
FIRE PROTECTION FEATURES FOR SAFE SHUTDOWN CAPABILITIES

Type Fire	Fire/Water Disables Normal Shutdown Capability	Shutdown from Control Room Available	Shutdown from Alternate Panel Required	Access for Manual Fire Fighting	Fixed Suppression Systems Required
IN-SITU	NO	YES	NO	GOOD	NO
				POOR	YES–MANUAL
	YES	NO	YES[1]	GOOD	YES–AUTOMATIC[2]
				POOR	YES–AUTOMATIC
EXPOSURE	NO	YES	NO	GOOD	NO
				POOR	YES–MANUAL
	YES	NO	YES[1]	GOOD	YES–AUTOMATIC
				POOR	YES–AUTOMATIC

[1] When the alternate shutdown capability is provided by an independent system dedicated to achieving and maintaining safe shutdown conditions, manually actuated fixed water systems or automatic gas suppression systems shall be provided for large concentrations of grouped electrical cables.

[2] Requirement for fixed suppression may be waived if (a) only in-situ combustible is cable insulation, (b) measures are provided to retard propagation, and (c) separation between redundant systems is at least 10 feet horizontal and vertical of clear air space.

h. **Fire Brigade**

A site fire brigade trained and equipped for firefighting shall be established to ensure adequate manual firefighting capability for all areas of the plant containing structures, systems, or components important to safety. The minimum size of the fire brigade shall be at least five members on each shift. The brigade leader and at least two brigade members shall be operations personnel or have equivalent knowledge of plant safety systems. The fire brigade members' qualifications shall include an annual physical examination for performing strenuous firefighting activity. The shift supervisor shall not be a member of the fire brigade. The brigade leader shall be competent to assess the potential safety consequences of a fire and advise control room personnel. Such competence by the brigade leader may be evidenced by possession of an operator's license or equivalent knowledge of plant safety systems. Equipment provided for the brigade will consist of at least the following:

1. Personal protective equipment such as turnout coats, boots, gloves, hard hat, and pressure demand full-vision self-contained breathing apparatus with a minimum one-half hour rated capacity and approved by National Institute of Occupational Safety and Health (NIOSH) for firefighting purposes.
2. Manual suppression equipment such as portable extinguishers and standpipe and hose with nozzles suitable for the location.
3. Other systems and equipment necessary for efficient utilization of the brigade, such as emergency lighting in access routes to areas containing safety-related systems or components, and emergency communication capability throughout the plant that is independent of the normal communication systems. Emergency communication equipment shall not interfere with other plant equipment or controls.

I. **Fire Brigade Training**

The firebrigade training program shall ensure that the capability to fight potential fires is established and maintained. The program shall consist of an initial classroom instruction

yard fire main without interrupting the fire water supply to any area containing or presenting a fire hazard to safety-related or safe shutdown equipment.

D. **Manual Fire Suppression**

Standpipe and hose systems shall be installed so that at least one effective hose stream will be able to reach any location that contains or could present an exposure fire hazard to safety-related equipment. Standpipe and hose stations shall be inside PWR containments and large BWR containments that are not inerted. For BWR dry wells, standpipe and hose stations shall be placed outside the dry well with adequate lengths of hose to reach any location inside the dry well with an effective hose stream.

E. **Hydrostatic Hose Tests**

Fire hose shall be hydrostatically tested at a pressure 50 psi above maximum service pressure. Hose stored in outside hose houses shall be tested annually. Interior standpipe hose shall be tested every three years.

F. **Automatic Fire Detection**

Automatic fire detection systems shall be installed in all areas of the plant that contain combustibles and safe shutdown or safety-related systems or components.

G. **Protection of Safe Shutdown Capability**

Protective features shall be provided for fire areas that contain cables or equipment of redundant systems important to achieving and maintaining safe shutdown conditions to ensure that at least one means of achieving said conditions survives postulated fires. The protective features may consist of a combination of automatic and manual fire suppression capability, fire propagation retardants, physical separation, partial fire barriers, or alternate shutdown capability independent of the fire area.

1. The design of the protective features shall consider:
   a. The zone of influence of postulated fires and the fire extinguishing system used in the fire area.
   b. The access for manual firefighting.

c. The potential disabling effects of water on shutdown capability.

d. The limitations of fixed suppression systems.

e. The separation between redundant divisions.

f. The in situ and transient combustibles.

g. The propagation rate of fire in the configuration.

h. The availability of shutdown capability independent of the fire area.

i. That all organic cable insulation and jacket material is combustible.

j. That metal conduit, covered cable trays, or solid bottom cable trays retard fire propagation but do not by themselves serve as a fire barrier to prevent the loss of function of the cables.

k. That fire retardant coatings retard fire propagation but do not prevent organic cable insulation and jacket materials from burning.

l. That oxygen is available to support combustion.

m. The failure of automatic fire suppression systems.

n. That the response of the fire brigade may be delayed.

o. That room air coolers do not provide adequate protection for shutdown systems by removing heat generated by a fire.

2. The following minimum fire protective features shall be provided:

a. An early warning fire detection system.

b. Manual fire suppression capability.

c. Fixed fire suppression systems and alternate shutdown capability as shown on Table 1.[4]

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[4] A fire hazards analysis acceptable to the staff shall be used to determine whether the plant can be shut down from the Control Room and whether access for manual firefighting is good.

program followed by periodic classroom instruction, practice in firefighting, and fire drills:

1. **Instruction**

   a. The initial classroom instruction shall include:

   (1) Indoctrination of the plant firefighting plan with specific coverage of each individual's responsibilities.

   (2) Identification of the fire hazards and associated types of fires that could occur in the plant and an identification of the location of such hazards.

   (3) The toxic characteristics of expected products of combustion.

   (4) Identification of the location of fire fighting equipment for each fire area and familiarization with the layout of the plant, including access and egress routes to each area.

   (5) The proper use of available fire fighting equipment and the correct method of fighting each type of fire. The types of fires covered should include electrical fires, fires in cables and cable trays, hydrogen fires, fires involving flammable and combustible liquids or hazardous process chemicals, construction fires, and record file fires.

   (6) The proper use of communication, lighting, ventilation, and emergency breathing equipment.

   (7) The proper method for fighting fires inside buildings and confined spaces.

   (8) The direction and coordination of the firefighting activities (fire brigade leaders only).

   (9) Detailed review of firefighting strategies and procedures.

   (10) Review of the latest plant modifications and corresponding changes in firefighting plans.

Note: Items (9) and (10) may be deleted from the training of non-operations personnel who may be assigned to the fire brigade.

b. The instruction shall be provided by qualified individuals who are knowledgeable, experienced, and suitably trained in fighting the types of fires that could occur in the plant and in using the types of equipment available in the nuclear power plant.

c. Instruction shall be provided to all fire brigade members and fire brigade leaders.

d. Regular planned meetings shall be held at least every 3 months for all brigade members to review changes in the fire protection program and other subjects as necessary.

e. Periodic refresher training sessions shall be held to repeat the classroom instruction program for all brigade members over a two year period. These sessions may be concurrent with the regular planned meetings.

2. **Practice**

Practice sessions shall be held for each shift fire brigade on the proper method of fighting the various types of fires that could occur in a nuclear power plant. These sessions shall provide brigade members with experience in actual fire extinguishment and the use of emergency breathing appartus under strenuous conditions encountered in fire fighting. These practice sessions shall be provided at least once per year for each fire brigade member.

3. **Drills**

a. Fire brigade drills shall be performed in the plant so that the fire brigade can practice as a team.

b. Drills shall be performed at regular intervals not to exceed 3 months for each shift fire brigade.

Each fire brigade member should participate in each drill, but must participate in at least two drills per year.

A sufficient number of these drills, but not less than one for each shift fire brigade per year, shall be unannounced to determine the fire fighting readiness of the plant fire brigade, brigade leader, and fire protection systems and equipment. Persons planning and authorizing an unannounced drill shall assure that the responding shift fire brigade members are not aware of the time or location of the drill until it is begun.

At least one drill per year shall be performed on a "back shift" for each shift fire brigade.

c. The drills shall be preplanned to establish the training objectives of the drill and shall be critiqued to determine how well the training objectives have been met. Unannounced drills shall be planned and critiqued by members of the management staff responsible for plant safety and security. Performance deficiencies of a fire brigade or of individual fire brigade members shall be remedied by scheduling additional training for the brigade or members. Unsatisfactory drill performance shall be followed by a repeat drill within 30 days.

d. At 3 year intervals, drills shall be critiqued by qualified individuals independent of the licensee's staff. A copy of the written report from such individuals shall be submitted to NRC for evaluation.

e. Drills shall as a minimum include the following:

(1) Assessment of fire alarm effectiveness, time required to notify and assemble fire brigade, and selection, placement and use of equipment, and firefighting strategies.

(2) Assessment of each brigade member's knowledge of his role in the firefighting strategy for the

area assumed to contain the fire. Assessment of the brigade member's conformance with established plant firefighting procedures and use of firefighting equipment, including self-contained emergency breathing appartus, communication equipment, and ventilation equipment, to the extent practicable.

(3) The simulated use of firefighting equipment required to cope with the situation and type of fire selected for the drill. The area and type of fire chosen for the drill should be varied such that brigade members are trained in fighting fires in all safety-related areas. The situation selected should simulate the size and arrangement of a fire which could reasonably occur in the area selected, allowing for fire development due to the time required to respond, to obtain equipment, and organize for the fire, assuming loss of automatic suppression capability.

(4) Assessment of brigade leader's direction of the firefighting effort, as to thoroughness, accuracy, and effectiveness.

4. Records

Individual records of training provided to each fire brigade member, including drill critiques, shall be maintained for at least 4 years to ensure that each member receives training in all parts of the training program. These records of training shall be available for review. Retraining or broadened training for fire fighting within buildings shall be scheduled for all those brigade members whose performance records show deficiencies.

J. Emergency Lighting

Emergency lighting shall be provided in all areas needed for operation of safe shut down equipment and in access routes to all safety-related areas and other areas presenting a fire hazard to safety-related areas. Such emergency lighting may

be provided by the normal lighting if it is connected to an emergency bus and the fire hazard analysis shows that it will not be damaged by any fire. Otherwise permanently installed sealed beam or florescent units with individual 8-hour minimum battery power supply shall be provided.

K. **Administrative Controls**

Administrative controls shall be established to minimize fire hazards in areas containing structures, systems, and components important to safety. These controls shall establish procedures to:

1. Govern the handling and limitation of the use of ordinary combustible materials, combustible and flammable gases and liquids, high efficiency particulate air and charcoal filters, dry ion exchange resins, or other combustible supplies in safety-related areas.
2. Prohibit the storage of combustibles in safety-related areas or establish designated storage areas and fire protection therefor.
3. Govern the handling of and limit transient fire loads such as combustible and flammable liquids, wood and plastic products, or other combustible materials in buildings containing safety-related systems or equipment during maintenance, modification, or refueling operations.
4. Designate the onsite staff member responsible for the in-plant fire protection review of proposed work activities to identify potential transient fire hazards specify required additional fire protection in the work activity procedure.
5. Govern the use of ignition sources by means of a flame permit system that controls welding, flame cutting, brazing, or soldering operations. A separate permit shall be issued for each area where work is to be done, and if work continues over more than one shift, the permit shall be valid for not more than 24 hours.

6. Govern the removal from the area of all waste, debris, scrap, oil spills, or other combustibles resulting from the work activity immediately following completion of the activity, or at the end of each work shift, whichever comes first.

7. Govern the periodic housekeeping inspections to ensure continued compliance with these administrative controls.

8. Govern the use of specific combustibles in safety-related areas. All wood used in safety-related areas during maintenance, modification, or refueling operations (such as lay-down blocks or scaffolding) shall be flame-retardant treated. Equipment or supplies (such as new fuel) shipped in untreated combustible packing containers may be unpacked in safety-related areas if required for valid operating reasons. However, all combustible materials shall be removed from the area immediately following the unpacking. Combustible material shall not be left unattended during lunch breaks, shift changes, or other similar periods. Loose combustible packing material such as wood or paper excelsior shall be placed in metal containers with tight-fitting self-closing metal covers.

9. Govern actions to be taken by individual discovering the fire, such as notification of control room, attempt to extinguish fire, and actuation of local fire suppression systems.

10. Govern actions to be taken by the control room operator to determine the need for brigade assistance upon report of a fire or receipt of alarm on control room annunciator panel, such as announcing location of fire over PA system, sounding fire alarms, and notifying the shift supervisor and the fire brigade leader of the type, size, and location of the fire.

11. Govern actions to be taken by the fire brigade after notification by the control room operator of a fire, such as assembling in a designated location, receiving directions from the specific fire fighting fire brigade

leader, and, discharging specific fire fighting responsibilities including selection and transportation of fire fighting equipment to fire location, selection of protective equipment, use of fire suppression systems operating instructions, and use of preplanned strategies for fighting fires in specific areas.

12. Define the strategies for fighting fires in all safety-related areas and areas presenting a hazard to safety-related equipment. These strategies shall designate:

    a. Fire hazards in each area covered by the specific fire fighting procedures.

    b. Fire extinguishants best suited for controlling the fires associated with the fire hazards in that area and the nearest location of these extinguishants.

    c. Most favorable direction from which to attack a fire in each area, in view of the ventilation direction, access hallways, stairs, and doors that are most likely to be fire free, and the best station or elevation for fighting the fire. All access and egress routes that involve locked doors should be specifically identified in the procedure with the appropriate precautions and methods for access specified.

    d. Plant systems that should be managed to reduce the damage potential during a local fire; location of local and remote controls for such management (e.g., any hydraulic or electrical systems in the zone covered by the specific fire fighting procedure that could increase the hazards in the area because of overpressurization or electrical hazards).

    e. Vital heat-sensitive system components that need to be kept cool while fighting a local fire. Particularly hazardous combustibles should be designated to receive cooling.

    f. Organization of firefighting brigades and the assignment of special duties according to job

title so that all fire fighting functions are covered by any complete shift personnel complement. These duties include command control of the brigade, transporting fire suppression and support equipment to the fire scenes, applying the extinguishant to the fire, communication with the control room, and coordination with outside fire departments.

g. Radiological and toxic hazards in fire zones.

h. Ventilation system operation that ensures desired plant pressure distribution when the ventilation flow is modified for fire containment or smoke clearing operations.

i. Operations requiring control room and shift engineer coordination or authorization.

j. Instructions for plant operators and general plant personnel during fire.

L. **Alternate Shutdown Capability**

1. If the combination of fire protection features required for safe shutdown includes alternate shutdown capability independent of a specific fire area, the design for such alternate shutdown capability shall accommodate postfire conditions where offsite power is available and where offsite power is not available for 72 hours.

If there are several such areas, the combinations of systems that provide the shutdown capability may be unique for each critical area. However, the shutdown capability provided for each such area shall be able to achieve and maintain subcritical reactivity conditions in the reactor, maintain reactor coolant inventory, achieve and maintain hot standby[5] conditions for a PWR (hot shutdown[5] for a BWR) for at least 72 hours, achieve cold shutdown[5] conditions within 72 hours and maintain cold shutdown conditions thereafter. The reactor coolant system process variables shall be maintained within those predicted for a loss of normal ac power. The fission product boundary integrity shall not be affected; i.e., there shall be no fuel clad damage,

[5] As defined in the Standard Technical Specifications.

rupture of any primary coolant boundary, or rupture of the containment boundary.

2. The performance goals for the shutdown functions shall be:

a. The reactivity control function shall be capable of achieving and maintaining cold shutdown reactivity conditions.

b. The reactor coolant makeup function shall be capable of maintaining the reactor coolant level above the top of the core for BWRs and in the pressurizer for PWRs.

c. The reactor heat removal function shall be capable of achieving and maintaining decay heat removal.

d. The process monitoring function shall be capable of providing direct readings of the process variables necessary to perform and control the above functions.

e. The supporting functions shall be capable of providing the process cooling, lubrication, etc., necessary to permit the operation of the equipment used for safe shutdown functions.

3. Various safety-related and non safety-related equipment and/or systems may be identified by the licensee and accepted by the staff to provide alternative means to achieve and maintain hot standby conditions (hot shut down for a BWR). The fire hazards analysis shall show that at least one means to achieve and maintain hot standby conditions (hot shutdown for a BWR) is undamaged by any fire anywhere in the plant. In addition, the equipment and systems comprising that means of hot standby or hot shut down condition shall be capable of maintaining such conditions for at least 72 hours if the equipment required to achieve and maintain cold shutdown is not available because of fire damage. They shall also be capable of being powered by both onsite and offsite electric power systems or by onsite power systems that are independent of the onsite and offsite electric power systems. The number of operating shift personnel, exclusive of fire brigade members, required to

shift personnel, exclusive of fire brigade members, required to operate the equipment and systems shall be onsite at all times.

4. The fire hazards analysis shall show that either (a) any equipment and/or systems necessary to achieve and maintain cold shut down conditions will not be damaged by any fire; or (b) that any equipment and/or systems necessary to achieve and maintain cold shutdown conditions that are damaged by fire can be repaired and cold shut down achieved within 72 hours. Materials for such repairs shall be readily available onsite and procedures shall be in effect to implement such repairs. Equipment and systems used prior to 72 hours after the fire shall be capable of being powered by both onsite and offsite electrical power systems or by onsite power systems that are independent of the onsite and offsite electric power systems; equipment and systems used after 72 hours may be powered by offsite power.

These shutdown systems need not be designed to meet seismic Category I criteria or single failure criteria; or to cope with other plant accidents such as pipe breaks or stuck valves except where required for other reasons, e.g., because of interface with or impact on existing safety systems.

M. **Fire Barriers**

Fire barriers (floors, walls, ceilings, or other enclosures) separating fire areas, or equipment or components or redundant systems important to safe shutdown within an area, shall have a fire rating of 3 hours unless a lower rating is justified by the fire hazard analysis.

Structural steel forming a part of or supporting such fire barriers shall have fire resistance equivalent to that required of the barrier. Such fire resistance shall be provided by protection equivalent to metal lath and plaster covering.

Penetrations in these fire barriers, including conduits, cable trays, and piping, shall be sealed or closed to provide fire resistance rating equivalent to that required of the barrier. Door openings shall be protected with doors, frames, and hardware that have been tested and approved by a nationally recognized testing laboratory to have a fire resistance rating equivalent to that required of the barrier.

Penetrations for ventilation systems shall be protected by a standard "fire door damper."

N. **Fire Barrier Penetration Seal Qualifications**

Penetration seal designs shall be qualified by an independent testing laboratory in accordance with American Society for Testing Materials, ASTM E-119 and the following conditions:

1. The cables used in the test shall be of the same type of construction as those used in the facility.
2. The test arrangement shall be representative of the worst-case configuration of cable loading, cable tray arrangement, anchoring, and penetration fire barrier size and design. The test sample shall also be representative of the cable sizes in the facility. Testing of the penetration fire barrier in the floor configuration will qualify the fire stop for use in the wall configuration also.
3. Cables penetrating the fire barrier shall extend at least 3 feet on the unexposed side and at least 1 foot on the exposed side.
4. The fire barrier shall be tested in both directions unless the fire barrier is symmetrical.
5. The fire barrier shall be tested with a pressure differential across it (higher pressure on the exposed side) that is equivalent to the maximum pressure differential a fire barrier in the plant is expected to experience unless such pressure differentials are shown to have no effect on the performance of the penetration seal.
6. The temperature levels of the cable insulation, cable conductor, cable tray, conduit, and fire stop material shall be recorded for the unexposed side of the fire barrier.
7. As an alternative to the standard straight-stream hose test stipulated in Section 9.4 and 9.5 of ASTM E-119, either of the following tests may be used:

a. Two identical test specimens are exposed to the standard fire. After 1 hour, one specimen is subjected to the standard straight-stream hose test stipulated in ASTN E-119, while the other continues to be exposed to the standard fire for the full 3 hours; or

b. The single test specimen, immediately after the 3-hour standard fire exposure, is subjected to a water fog test using a high-velocity fog nozzle having an included angle of spray no larger than 30° and supplied by a hose no smaller than 1½ inches at a pressure of at least 75 psig measured at the base of the nozzle for an application time of at least 2½ minutes per 100 sq ft of test specimen.

8. Acceptance Criteria – The test is successful if:

a. The cable penetration fire barrier has withstood the fire endurance test without passage of flame or ignition of cables on the unexposed side for a period of 3 hours,

b. The temperature levels recorded for the unexposed side are analyzed and demonstrate that the maximum temperature is sufficiently below the cable insulation ignition temperature, and

c. The fire barrier remains intact and does not allow projection of water beyond the unexposed surface during the hose stream test.

O. **Fire Doors**

Fire doors shall be self-closing or provided with closing mechanisms and shall be inspected semiannually to verify that automatic hold-open, release, and closing mechanisms and latches are operable. Fire doors shall be kept closed unless provided with automatic hold-open, release, and closing mechanisms.

One of the following measures shall also be provided:

1. Fire doors shall be electrically supervised at a continuously manned location; or
2. Fire doors shall be locked closed and inspected weekly to verify that the doors are in the closed position; or
3. Fire doors shall be provided with automatic hold-open and release mechanisms and inspected daily to verify that doorways are free of obstructions; or
4. Fire doors shall be kept closed and inspected daily to verify that they are in the closed position.

The fire brigade commander shall have ready access to keys for any locked fire doors.

Areas protected by automatic total flooding gas suppression systems shall have electrically supervised self-closing fire doors.

P. **Reactor Coolant Pump Lubrication System**

The reactor coolant pump lubrication system shall be protected by either an oil collection system or an automatic fire suppression system.

Oil collection systems shall be capable of collecting lube oil from all potential pressurized and unpressurized leakage sites in the reactor coolant pumps' lube oil systems, and draining the oil to a vented closed container. A flame arrestor is required in the vent if the flash point characteristics of the oil present the hazard of fire flashback. Leakage points to be protected shall include lift pump and piping, overflow lines, lube oil cooler, oil fill and drain lines and plugs, flanged connections on oil lines and lube oil reservoirs where such features exist on the reactor coolant pumps. Leakage shall be collected and drained to a closed container that can hold the entire lube oil system inventory. The drain line shall be large enough to accommodate the largest potential oil leak.

To provide adequate protection for a design basis Safe Shutdown Earthquake (SSE), one of the following should be provided:

1. The lube oil system components whose failure could result in leakage should be designed to withstand an SSE without leakage and the dropping of oil collection system components during an SSE should not cause loss of operability of safety-related equipment; or

2. The oil collection system should be designed to withstand an SSE and continue to be able to collect and drain leakage that may occur during an SSE. In this case the oil collection system should be adequate to collect oil from any external lube oil piping not designed to withstand an SSE in addition to leakage from points identified above.

If an automatic fire suppression system is selected, either the automatic and manual fire suppression system or the lube oil system components whose failure could result in leakage should be designed to withstand the SSE.

Q. **Associated Circuits**

Associated circuits shall be electrically isolated from safety equipment so that hot shorts, open circuits, or shorts to ground in the associated circuit will not prevent operation of the safety equipment.

If associated circuits are not known to be so electrically isolated, they shall be considered safe shutdown circuits. The separation and barriers between trays and conduits containing associated circuits of one safe shutdown division and trays and conduits containing associated circuits or safe shutdown cables from the redundant division shall be such that a postulated fire involving associated circuits will not prevent safe shutdown.[6]

All interested persons who desire to submit written comments or suggestions concerning the proposed rulemaking should send their comments to the Secretary of the Commission,

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[6] An acceptable method of complying with this alternative would be to meet Regulatory Guide 1.75 position 4 related to associated circuits and IEEE 384-1974 (Section 4.5) where trays from redundant safety divisions are so protected that postulated fires affect trays from only one safety division.

U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Docketing and Service Branch, on or before June 30, 1980. Copies of comments received on the proposed amendments may be examined in the Commission's Public Document Room at 1717 H Street, N.W., Washington, D.C.

(Sec. 161b, Pub. Law 83-703, 68 Stat. 948; Sec. 201, Pub. Law 93-438, 88 Stat. 1242 (42 U.S.C. 2201(b), 5841).)

Dated at Washington, D.C. this 21st day of May, 1980.

For the Nuclear Regulatory Commission.

Samuel J. Chilk
Secretary of the Commission

APPENDIX D

SECTION 4 OF THE ADMINISTRATIVE PROCEDURE ACT, AS AMENDED, 5 U.S.C. §553

§553. Rule making

(a) This section applies, according to the provisions thereof, except to the extent that there is involved –

(1) a military or foreign affairs function of the United States; or

(2) a matter relating to agency management or personnel or to public property, loans, grants, benefits, or contracts.

(b) General notice of proposed rule making shall be published in the Federal Register, unless persons subject thereto are named and either personally served or otherwise have actual notice thereof in accorannce with law. The notice shall include–

(1) a statement of the time, place, and nature of public rule making proceedings;

(2) reference to the legal authority under which the rule is propsed; and

(3) either the terms or substance of the proposed rule or a description of the subjects and issues involved.

Except when notice or hearing is required by statute, this subsection does not apply –

(A) to interpretive rules, general statements of policy, or rules of agency organization, procedure, or practice; or

(B) when the agency for good cause finds (and incorporates the finding and a brief statement of reasons therefor in the rules issued) that notice and public procedure thereon are impracticable, unnecessary, or contrary to the public interest.

(c) After notice required by this section, the agency shall give interested persons an opportunity to participate in the rule making through submission of written data, views, or arguments

with or without opportunity for oral presentation. After consideration of the relevant matter presented, the agency shall incorporate in the rules adopted a concise general statement of their basis and purpose. When rules are required by statute to be made on the record after opportunity for an agency hearing, sections 556 and 557 of this title apply instead of this subsection.

(d) The required publication or service of a substantive rule shall be made not less than 30 days before its effective date, except –

(1) a substantive rule which grants or recognizes an exemption or relieves a restriction;

(2) interpretative rules and statements of policy; or

(3) as otherwise provided by the agency for good cause found and published with the rule.

(e) Each agency shall give an interested person the right to petition for the issuance, amendment, or repeal of a rule.

APPENDIX E

SECTION 10(e) OF THE ADMINISTRATIVE PROCEDURE ACT, AS AMENDED, 5 U.S.C. §706

§706. Scope of review

To the extent necessary to decision and when presented, the reviewing court shall decide all relevant questions of law, interpret constitutional and statutory provisions, and determine the meaning or applicability of the terms of an agency action. The reviewing court shall –

(1) compel agency action unlawfully withhedl or unreasonably delayed; and

(2) hold unlawful and set aside agency action, findings, and conclusions found to be –

(A) arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law;

(B) contrary to constitutional right, power, privilegel, or immunity;

(C) in excess of statutory jurisdiction, authority, or limitations, or short of statutory right;

(D) without observance of procedure required by law;

(E) unsupported by substantial evidence in a case subject to sections 556 and 557 of this title or otherwise reviewed on the record of an agency hearing provided by statute; or

(F) unwarranted by the facts to the extent that the facts are subject to trial de novo by the reviewing court.

In making the foregoing determinations, the court shall review the whole record or those parts of it cited by a party, and due account shall be taken of the rule of prejudicial error.

CERTIFICATE OF SERVICE

I hereby certify that I have this 14th day of June, 1982, caused to be served the foregoing Petition for a Writ of Certiorari, by mailing three copies of said Petition to the parties to the proceeding at the following addresses:

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